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WEAPONS of WWII

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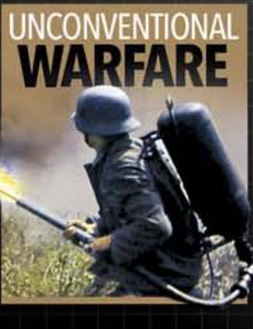

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BIG ARMY *and* LITTLE ARMY

"What do you want to do today, Steve, play Big Army or Little Army?"

It seems about 100 years ago when my boyhood pals asked that question.

Little Army meant that we would haul our boxes of toy soldiers to my backyard where, much my mother's displeasure, we would dig miniature fox holes and fortify our positions by moving rocks that days afterward might wage a fierce battle with the family lawnmower.

We were extremely interested in learning specifics about the weapons of war. Some of my friends could describe every tank, every rocket launcher, every weapon the real U.S. Army used in astonishing detail.

Big Army meant that we would dress up as soldiers. We'd shoulder our toy guns—yes, we had them; it was that long ago. I had a bolt action rifle patterned after a 1903 Springfield and a fairly close replica of a Thompson submachine gun.

We'd go on dangerous missions throughout the neighborhood, sometimes fighting our way through thick jungles of laundry that in those days was still hung outside on clotheslines to dry.

Looking back, we weren't glorifying war and our toy guns never cultivated a penchant for violence. In our childhood games we were playing out small dramas, fighting life and death battles against overwhelming odds in an effort to conquer evil.

> **"...WE ARE CELEBRATING TRIUMPHS IN LIFE AND DEATH BATTLES AGAINST OVERWHELMING ODDS THROUGH HEROIC EFFORT."**

Of course we just thought we were having fun. But that play-acting instilled in me the idea that bad things don't always go away by ignoring them. Sometimes the right thing, the necessary thing is to stand your ground against an aggressor bent on doing you harm. Sometimes you have no choice but to meet force with force through heroic effort.

The young men of the Allied armies, many of them teenagers, who were sent to Europe, Africa and the South Pacific in World War II were standing up to evil aggressors. There was no other choice.

With this publication, neither are we glorifying war. In this, the 70th anniversary of the end of World War II, we are celebrating triumphs in life and death battles against overwhelming odds through heroic effort.

The weapons and machines that helped them to achieve victory are the focus here. From the large tanks to the small arms—the Big Army and Little Army if you will—we are covering a bit of everything that was used, not just on the land, but on the sea and in the air as well. And my new pals, the writers who contributed to this project, describe it all in astonishing detail.

Steven Paul Barlow, Editor

WEAPONS of WWII

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By Stratten Waldt

OFFENSIVE WARSHIPS

Aircraft Carriers Played A Vital Role In Force Projection

The history of the aircraft carrier is relatively short in comparison to other weapons of war.

Carriers have their roots in balloon carriers, which were utilized as early as 1806 primarily to provide reconnaissance and seaplane carriers, which were seen as early as 1911 with the French Navy's Foudre.

This style of ship carried seaplanes, which were retrieved from the water with the crane. By 1918, the British had designed the first purpose-built aircraft carrier, which signaled the beginning of a new age in naval combat. The HMS Hermes entered service in 1924.

You're now about to enter the realm of World War II's majestic carriers.

BRITISH CARRIERS

At the outset of the war, the Royal Navy had seven aircraft carriers, which gave them a large numerical advantage because neither Germany nor Italy had carriers of their own. For the Allies, escort carriers were vital to counter the threat posed by German U-boats, which had proved capable of devastating the Atlantic convoys that were so important to the war effort.

The aircraft from the HMS Ark Royal and HMS Victorious were key in slowing down the German battleship Bismarck. The British were also able to use the HMS Victorious in an attack on the Italian fleet at Taranto, sinking three of the six battleships there. This signaled the beginning of the use of aircraft carriers in long-range strikes with relatively short-range aircraft.

JAPANESE CARRIERS

In the Pacific, Japan began the war with 10 aircraft carriers, what was then the largest and most technologically advanced fleet in the world. These were responsible for the success of the surprise attack on Pearl Harbor on Dec. 7, 1941.

For the attack, Japan amassed six aircraft carriers into a single striking unit, which concentrated naval power in a manner never before seen. Also in 1941, Japanese forces sank Prince of Wales and Repulse, a British battleship and battle cruiser respectively, north of Singapore, severely diminishing British naval presence in the Pacific.

Combined with the attack on Pearl Harbor only a few days earlier, the Japanese demonstrated thoroughly the effectiveness of aerial attacks on naval assets, as well as how vulnerable naval assets were to air attacks when they were not defended by aircraft.

U.S. BUILTS THE ESSEX CLASS

The most common type of aircraft carrier during World War II for the U.S. was the Essex class. The U.S. produced 24 of them over the course of the war and they continued to form the core of the U.S. Navy's combat strength well into the 1970s, when super carriers began to enter the fleet.

There were two varieties of Essex carriers: the original short-hull design and the long-hull version that entered service in 1943. This version provided increased deck space for quadruple 40 mm mounts. Not a single Essex class carrier was sunk in combat.

Exxex Class Carrier Class

Displacement
27100 BRT

Length
872/888 feet

Complement
2,631 men

Armament
12 x 5"/38AA DP guns (4x2, 4x1).
32 x 40mm
46 x 20mm
82 Aircraft

Max speed
33 knots

Did You Know?

To put the number of carriers active during World War II in perspective, the U.S. currently has 19 active carriers, half of the worldwide total of 38. In a very distant second is the French Navy with four carriers.

During the war, the U.S. produced and maintained in unbelievable 36 carriers, while Britain's Royal Navy fielded 24, and the French only one obsolete carrier.

U.S. CARRIERS

At the start of the war, the United States possessed seven carriers, though only three were operating in the Pacific. As the war progressed, however, the U.S. dramatically increased the number of carriers it fielded and there were multiple clashes between opposing carrier groups, which defined the course of the war.

The U.S. famously utilized the USS Hornet, a Yorktown-class carrier which was launched in late 1940, in the Doolittle Raid, which is often considered a pivotal moment in the war in the East. Sixteen B-25 Mitchell Medium bombers were launched from the Hornet to attack Tokyo.

The raid, while causing little material damage to the Japanese, demonstrated that it was vulnerable to U.S. attack and was important for boosting American morale. It called into question the ability of Japanese leaders to effectively defend the mainland. It also forced the Japanese to recall their strike force to home waters for the purpose of defense.

MIDWAY

The Doolittle Raid also contributed to Japanese Admiral Isoroku Yamamoto's decision to attack Midway Islands in June 1942, which turned into a defining victory for the U.S. Navy and caused irreparable damage to the Japanese fleet.

Japan lost four of its aircraft carriers, all of which had been part of the attack on Pearl Harbor six months earlier. The American carriers and the aircraft capabilities they provided proved decisive in the outcome of the battle.

The aircraft carrier drastically improved the defensive capabilities of naval forces and, by 1944, U.S. carriers were seriously threatened only by kamikaze attacks.

During the war, the method in which carrier groups were formed was changed. In the fifth fleet alone, there were now 15 carriers. This made it impossible to provide each carrier with its own protective screen. Fortunately, this was unnecessary and task groups consisting of four carriers, three to five cruisers and 12 to 14 destroyers were formed.

Though this made it more difficult to coordinate air power within each task force, it allowed for significantly more effective anti-aircraft defense, making it a worthy trade-off and helping to ensure that the U.S. lost no aircraft carriers after 1942.

Eventually, the U.S. effectively ended the reign of the battleship as the primary piece of fleet when it used carrier-borne aircraft to sink

A Grumman TBF-1 Avenger torpedo bomber takes an elevator ride to the flight deck of a U.S. carrier in 1943.

GETTY IMAGES

the largest battleships ever constructed—the Japanese superships Musashi and Yamato. The U.S. also destroyed the largest aircraft carrier of the war, the Shinano, in 1944. The submarine Archerfish was responsible.

For their part, the Germans never used an aircraft carrier in the course of the war. The closest they ever came was the KMS Graf Zeppelin, but it was never more than 80 percent complete. Construction delays, lack of aircraft and the domineering actions of air Marshal Herman Goering, who took issue with anything that might undermine his control of German air power, ensured that the ship would never enter service.

During the war, the Allies lost a total of only nine aircraft carriers—five British and four American. After Oct, 27, 1942, however, the Axis was unable to destroy any allied carriers, representing a fundamental shift in the tide of the war. Allied naval dominance only became more pronounced by 1945, and Britain and the U.S. ended the war having fielded a remarkable 60 combined carriers.

HMS Trumpeter patrolling the Atlantic in 1943.

BELOW: The HMS Ark Royal sinks after being struck by a torpedo from a German U-Boat in November 1941.

"JAPAN HAS ALWAYS REGARDED THE AIRCRAFT CARRIER AS ONE OF THE MOST OFFENSIVE OF ARMAMENTS."

–Isoroku Yamamoto, Japanese marshal admiral

TK TK

A Timeline

The Graf Zeppelin Never Completed

1935

On Nov. 16, the German Graf Zeppelin was contracted on this date and production began on Dec. 20.

1938

On Dec. 8, she was launched.

1939

By this year, she was 85 percent complete. The ship, however, was fated to never enter service. Continual construction issues, combined with administrative issues and the interference of Herman Goering meant that the carrier would never launch a single plane.

1940

The German conquest of Norway in in this year further delayed production, as any available cannons and anti-aircraft guns were appropriated in defense of the coastline.

1940

In July of this year, the ship was towed to Gdynia and was there used as a storage depot for Germany's hardwood supply.

1942

In May of this year, work resumed on the carrier, but was again halted by January 1943 when Hitler had become very discouraged by the performance of the Kriegsmarine's surface fleet.

1945

The order was given to scrap all of its larger ships. Though this order was later rescinded, the Graf Zeppelin was doomed and she was eventually scuttled in April of this year when the approach of the Red Army became imminent.

1947

The year the ship was finally sunk by the Soviets.

THE CARRIER'S EXPANDING ROLE

6 Key Facts

1

The purpose of an aircraft carrier is to deploy and recover aircraft and to operate as a mobile airbase. Prior to World War II, their use was limited, and their impact in World War I was minimal.

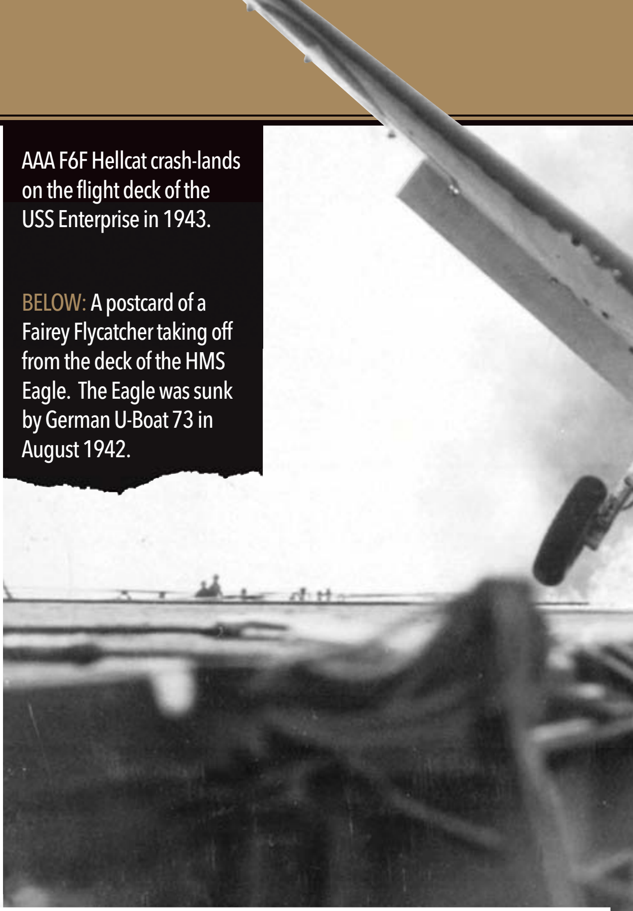
2

Between the wars, aircraft had become more and more important, and the role of carriers in launching, recovering and sustaining aircraft made them absolutely crucial to the outcome of the war. By the end of World War II, the aircraft carrier had replaced the battleship as the centerpiece of the modern fleet, recognizing that the core principles of naval warfare had changed.

3

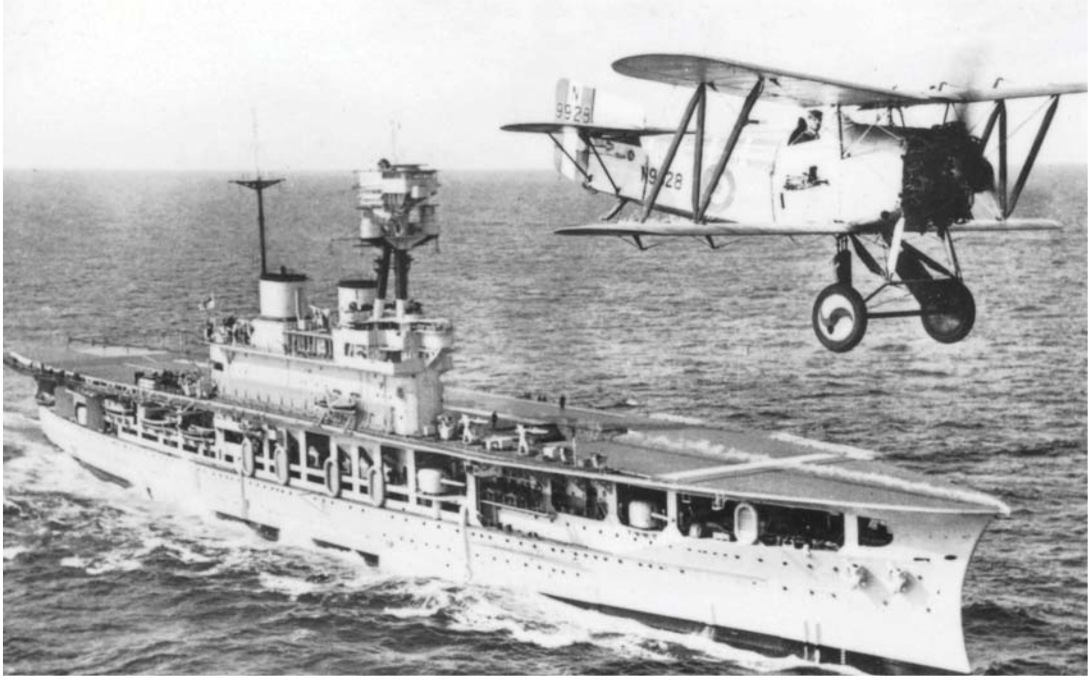
The aircraft carrier usually formed a part of a fast carrier force, being heavily defended by destroyers, light cruisers and battleships, as well as their own aircraft.

> **"THE NAVY OF ANY GREAT POWER … HAS THE DREAM TO HAVE ONE OR MORE AIRCRAFT CARRIERS."**
>
> –Major General Qian Lihua, China



AAA F6F Hellcat crash-lands on the flight deck of the USS Enterprise in 1943.

BELOW: A postcard of a Fairey Flycatcher taking off from the deck of the HMS Eagle. The Eagle was sunk by German U-Boat 73 in August 1942.



ON THE MAP

It was World War II that put the aircraft carrier on the map and made it a staple of the modern navy. Prior to the war, they had never played a significant role in any conflict. This changed significantly over the course of the war, and they came to define the war in the Pacific more than any other ship or weapon system (except perhaps the atomic bomb). They are considered a vital part of force projection in a world where a blue water navy is key for maintaining a presence internationally. **WOW**

Stratten Waldt is a freelance writer and army officer from Durham, North Carolina. He joined the Corps of Engineers after completing ROTC in 2013.

The smoke-filled USS Wasp sinks after being struck by three torpedoes from a Japanese submarine.

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4

By the beginning of World War II, carriers typically handled three different types of aircraft: dive bombers, fighters and torpedo bombers. Dive bombers flew directly over the target, initiated a steep dive, released their payload and then pulled out of the dive. Fighters were responsible for fleet defense and escort duty. Torpedo bombers were used for conventional bombings as well as reconnaissance, and carried a single torpedo that was dropped and propelled itself towards the target.

5

Aircraft carriers were considered primarily offensive weapons and when an enemy was located and in range, an attack was usually made. The maximum range for dive bombers and torpedo bombers was around 200 miles and they would typically be escorted by the carrier's fighters.

6

The U.S. had a tremendous advantage against Japan early in the war because of their radar capabilities. The Japanese were still relying on direct sight methods, using their fighters on combat air patrol, which provided them a max detection range of only five miles. U.S. ships, on the other hand, were able to detect enemy aircraft up to 80 miles away, giving them ample time to react.

By Marc DeSantis

A PACK OF WOLVES

MARK STEVENSON/GETTY IMAGES

How U-Boats Terrorized the Seas in World War II

When the Second World War began in September 1939, Nazi Germany began an aggressive effort to cut Great Britain off from the imports that she needed to feed her people and sustain her war effort.

Foremost among the weapons deployed by the Kriegsmarine against British trade was the U-boat, which proved so devastating that there was the real possibility that the island nation might be starved into submission. Wartime British Prime Minister Winston Churchill would later say that that of all the threats faced, "The only thing that ever really frightened me during the war was the U-boat peril."

The commander of the German U-boat fleet, and later commander of the entire German Kriegsmarine (Navy), Admiral Karl Dönitz, believed that if he had 300 U-boats he could strangle Britain and win the war, but when it started he had just 56. For the rest of the conflict, Donitz's U-boat men would race to sink Allied merchant ships faster than their replacements were built.

This is their story.

U-boat Aces

Several U-boat captains became known as "aces" as a result of their daring exploits, and none was more famous than Kapitänleutnant Gunther Prien, skipper of the Type VII U-47.

The Royal Navy had its main fleet base at Scapa Flow, in Scotland's Orkney Islands. The anchorage's defenses had not been kept up to scratch in the interwar years, and the Germans found an opening which Prien could exploit.

Though most of the fleet had already been sent out of the harbor to find shelter elsewhere because the British were themselves aware of Scapa Flow's vulnerability to submarine attack, the Royal Sovereign-class battleship HMS Royal Oak had been left behind along with the seaplane carrier HMS Pegasus.

On the night of September 13-14, 1939, Prien waited for the tide to come in and then carefully slipped past the blockships that had been sunk to keep out U-boats. Not long past midnight, Prien spotted the Royal Oak and ordered torpedoes launched. He scored a hit on the aging battleship, which sank with the loss of 800 of her sailors. The U-47 then made its escape from Scapa Flow and returned to Germany where Prien and the crew were feted as national heroes.

Mainstay of the U-boat Force: *The Type VII*

The workhorse of the German submarine fleet was the Type VII, which was built in greater numbers than any other U-boat, with some 691 emerging from German shipyards. Each had a single hull, in which the pressure hull also formed the exterior hull.

Fuel was stored in bunkers inside the pressure hull, and the boat was swathed in a streamlined casing that allowed the free-flooding of water between it and the pressure hull. An 88-millimeter cannon was mounted atop the sub on the foredeck in front of the conning tower, and a 20-millimeter antiaircraft gun sat on the aftdeck. Forty-four crewmen packed themselves within the tight spaces between the boats engines, weapons, and other equipment as best they could.

The first version of the boat to see service was the Type VIIA. It was a comparatively small craft with good performance. Admiral Dönitz wrote of the Type VII that it "was a reliable boat, easy and safe to handle. For its size it had the greatest possible fighting power . . . diving time was 20 seconds; it behaved very well under water, and it was relatively fast - 16 knots - and handy on the surface."

Its most serious drawback was its limited range of 6,200 miles. This made extended or

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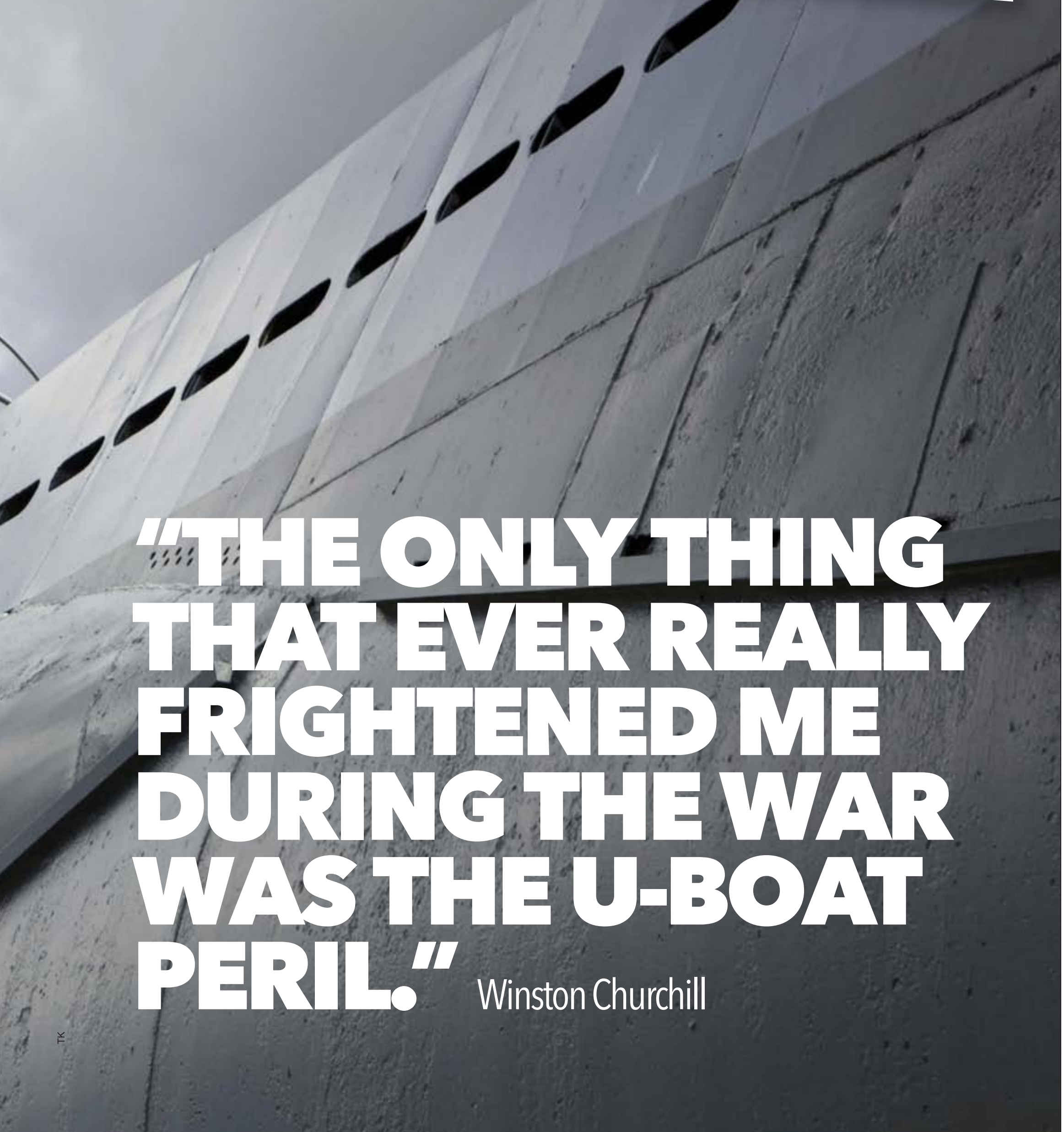

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BREAKING THE CODES

Britain's Admiralty had one extraordinary advantage in the U-boat war. Germany's military radio communications, including those of the U-boats, were encoded by typing the message into a peculiar typewriter known as the Enigma.

Each Enigma machine transposed via a series of three electrically-wired rotors a straightforward German-language communication into one of hundreds of millions possible ciphers. The encrypted message was then radioed to U-boats at sea or back to Dönitz's U-boat headquarters. The British intercepted these messages, but the Germans did not worry much about their code being broken, as there were too many possibilities for that to be a realistic threat, or so they thought.

However, the British did indeed break the code, and they established the Government Code and Cipher School at Bletchley Park to feed intelligence to their armed forces. The super-secret operation was called ULTRA, and throughout the war it provided the Royal Navy with invaluable intelligence as to the positions of U-boats, allowing the rerouting of passing convoys around them.

The Admiralty was much distressed when in November 1941 Dönitz improved the security surrounding the naval Enigma by adding a fourth rotor to his Enigma machines for his U-boat signals using the harder-to-crack Triton cipher key. This made Bletchley Park's job much more difficult, but on the whole, ULTRA continued to provide invaluable intelligence to Allied forces in fighting the U-boats.

> **"THE ONLY THING THAT EVER REALLY FRIGHTENED ME DURING THE WAR WAS THE U-BOAT PERIL."** Winston Churchill

Massacre in the Black Gap

As Allied airpower became more threatening, U-boats took to operating in the deadly "Black Gap" region of the central North Atlantic where they could operate out of range of shored-based patrol aircraft. In March 1943, U-boats reached their high point in their war against Allied shipping.

Two convoys, SC122 and HX229 were at the center of the maelstrom. SC122 sailed from New York on March 5th, while HX 229 departed New York on March 8th. Dönitz knew exactly when the convoys were leaving because Allied merchant shipping codes had been broken. Thirty-seven U-boats were directed to intercept the slow freighter convoys. On March 17th, the U-boats found ships from both convoys and began to sink them a frightful rate. Between the two convoys ninety merchant ships plied the sea. Twenty-two were sunk, some 146,000 tons of shipping altogether, with only a single U-boat being sunk in return. It seemed as if the Battle of the Atlantic was about to be won by Germany.

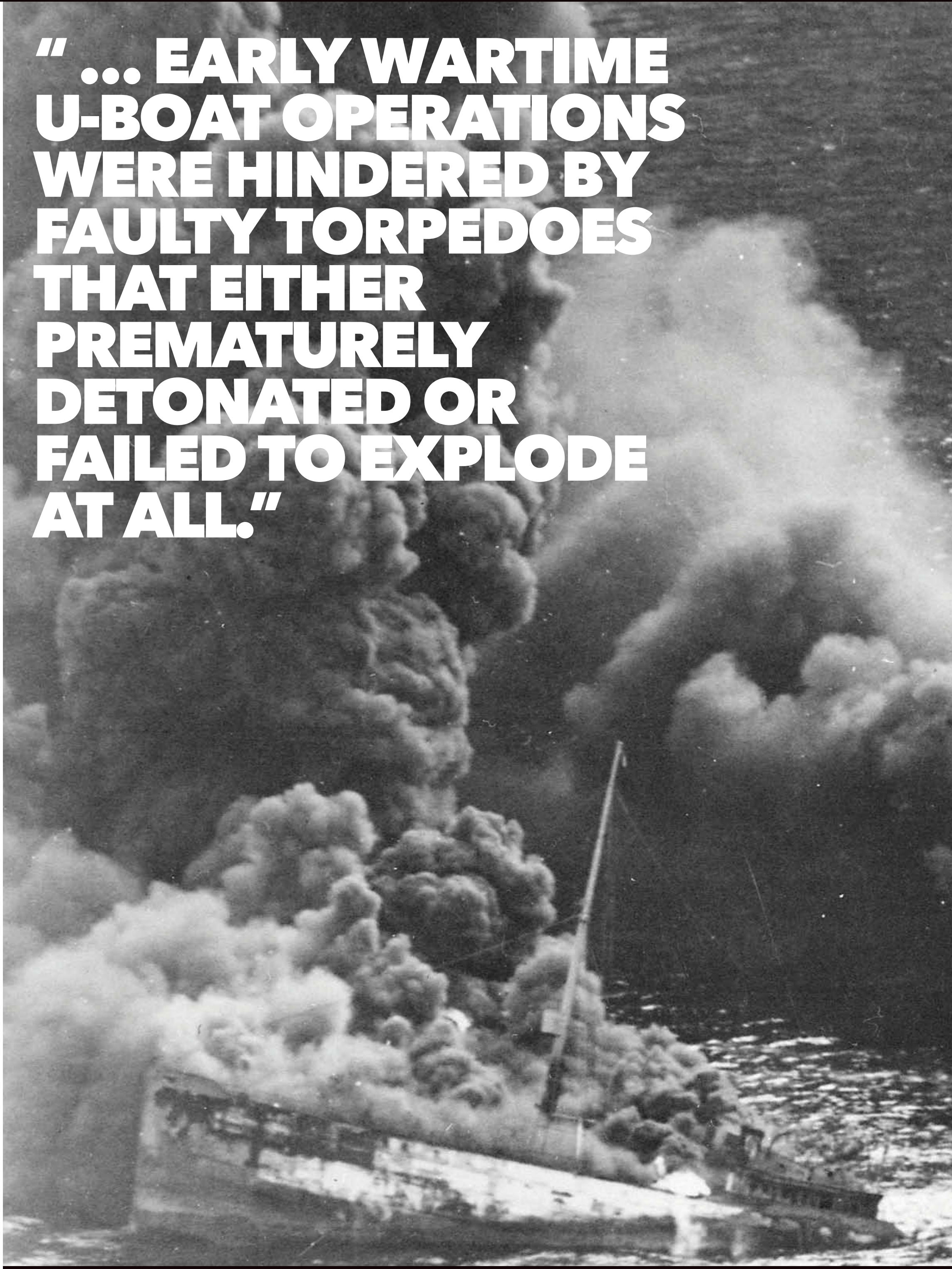
Fast Facts

1 The losses suffered by the U-boat crews were appalling. Of the 40,900 men who served on German submarines during the war, some 28,000, or approximately 70% were killed.

2 The U-boats accounted for over 2,600 ships sunk.

3 More than 30,000 Allied lives were lost in the Battle of the Atlantic.

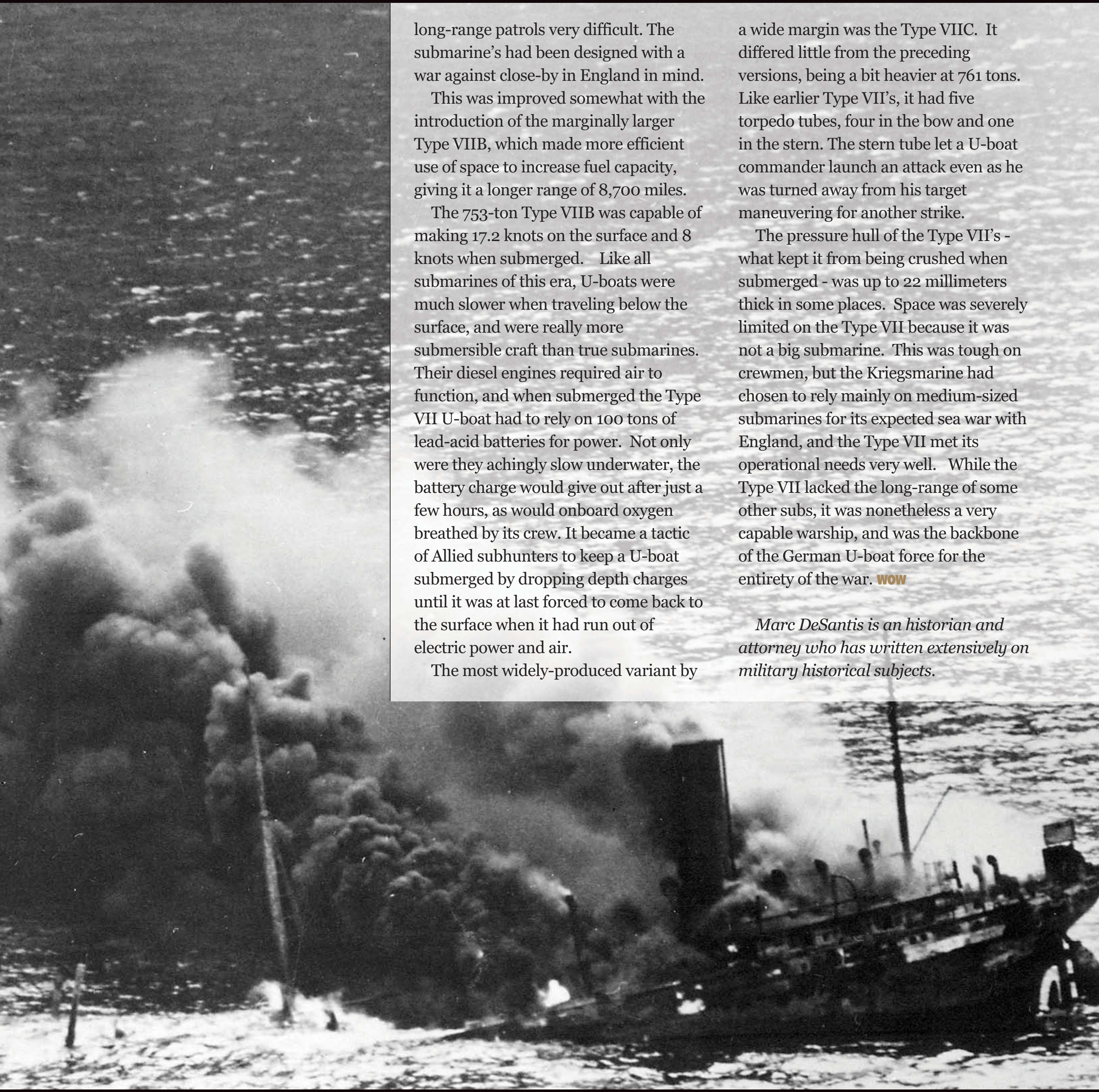
> " ... EARLY WARTIME U-BOAT OPERATIONS WERE HINDERED BY FAULTY TORPEDOES THAT EITHER PREMATURELY DETONATED OR FAILED TO EXPLODE AT ALL."



Torpedo Crisis

Despite some stunning successes, early wartime U-boat operations were hindered by faulty torpedoes that either prematurely detonated or failed to explode at all.

Though another major success was scored on Sept. 17, 1939 when the Type VII U-29 sank the aircraft carrier HMS Courageous, many other Allied ships and merchantmen escaped destruction even when targeted by multiple torpedoes and hits were upon them were heard by the men on the launching U-boat. Several causes for the misfires were eventually uncovered, including malfunctioning contact and magnetic firing pistols for the warheads, as well as excessive pressure buildup inside the torpedoes that made them run much deeper than they should have. It took until the end of 1942 for the U-boat's torpedo problems to be fully sorted out, by which time many enemy ships that might have been sent to the bottom escaped destruction.



long-range patrols very difficult. The submarine's had been designed with a war against close-by in England in mind.

This was improved somewhat with the introduction of the marginally larger Type VIIB, which made more efficient use of space to increase fuel capacity, giving it a longer range of 8,700 miles.

The 753-ton Type VIIB was capable of making 17.2 knots on the surface and 8 knots when submerged. Like all submarines of this era, U-boats were much slower when traveling below the surface, and were really more submersible craft than true submarines. Their diesel engines required air to function, and when submerged the Type VII U-boat had to rely on 100 tons of lead-acid batteries for power. Not only were they achingly slow underwater, the battery charge would give out after just a few hours, as would onboard oxygen breathed by its crew. It became a tactic of Allied subhunters to keep a U-boat submerged by dropping depth charges until it was at last forced to come back to the surface when it had run out of electric power and air.

The most widely-produced variant by a wide margin was the Type VIIC. It differed little from the preceding versions, being a bit heavier at 761 tons. Like earlier Type VII's, it had five torpedo tubes, four in the bow and one in the stern. The stern tube let a U-boat commander launch an attack even as he was turned away from his target maneuvering for another strike.

The pressure hull of the Type VII's - what kept it from being crushed when submerged - was up to 22 millimeters thick in some places. Space was severely limited on the Type VII because it was not a big submarine. This was tough on crewmen, but the Kriegsmarine had chosen to rely mainly on medium-sized submarines for its expected sea war with England, and the Type VII met its operational needs very well. While the Type VII lacked the long-range of some other subs, it was nonetheless a very capable warship, and was the backbone of the German U-boat force for the entirety of the war. **WOW**

Marc DeSantis is an historian and attorney who has written extensively on military historical subjects.

Wolfpack Mentality

Allied ships could only be sunk if they were first found, and so finding convoys became a mission of enormous importance for U-boat captains.

Admiral Dönitz was a strong proponent of "wolfpack" tactics in which several U-boats would gather to strike at a passing convoy as a group. A few subs might form a patrol line with each boat spaced at double the maximum visual distance, about 5 miles to either side, so that each could keep watch over large and contiguous sections of the ocean and prevent an Allied convoy from getting by unnoticed.

Once an enemy convoy had been found, the sighting U-boat would radio the enemy's position and course to Dönitz's U-boat headquarters in France, which would then alert all of the other submarines in the vicinity. The wolfpack would then form to attack the merchantmen as en masse.

ARMORED WARSHIPS

By Jim Dickson

Battleships Provided Explosive Power and Impenetrable Defense

It is renowned for its ability to absorb punishment. It has a reputation for power and might, and it created impenetrable defense.

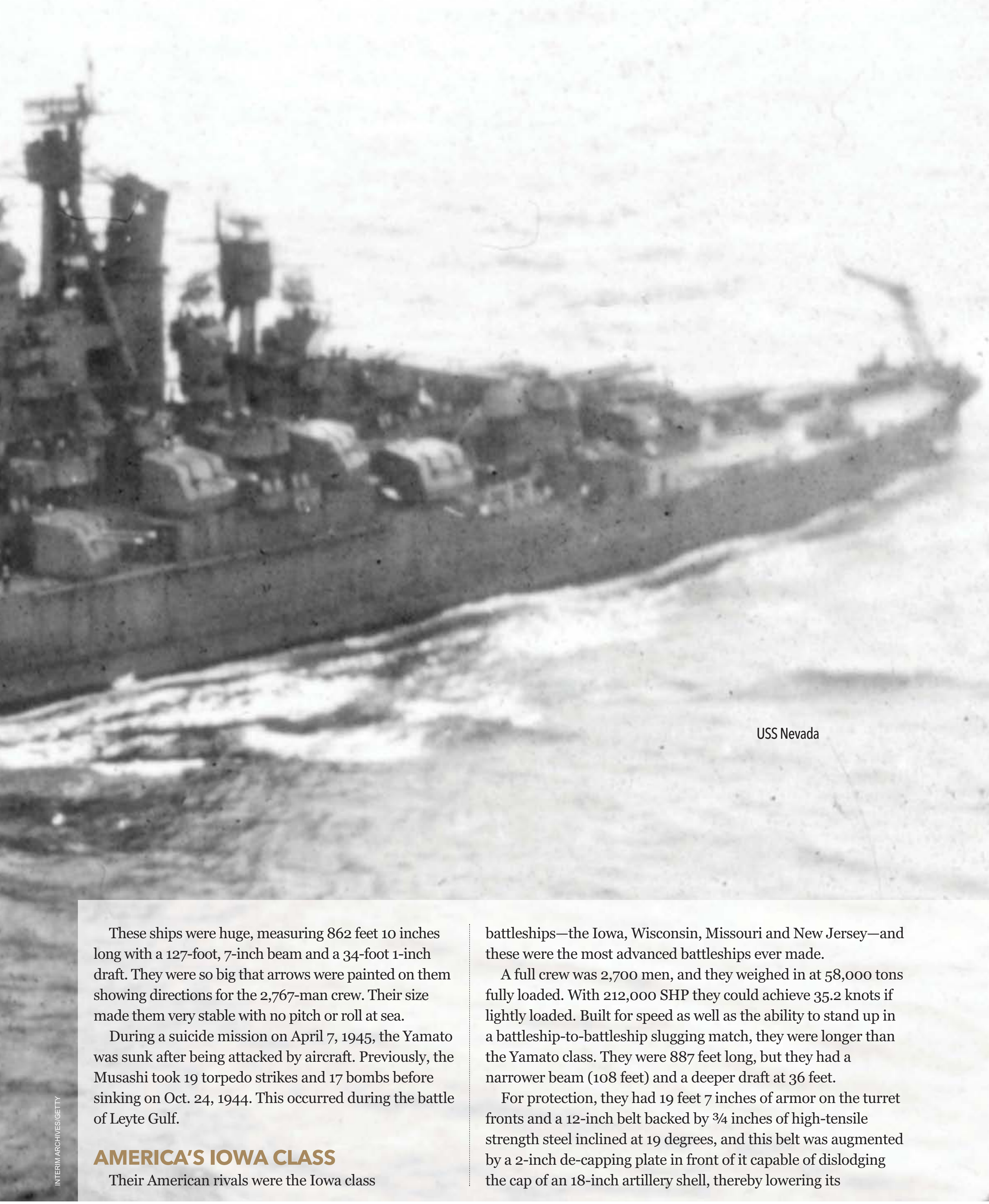
It is the battleship, and it is one of the most effective naval weapons ever created. Prepare now to step back in time to explore that world.

JAPAN'S YAMATO CLASS

Weighing in at 73,000 tons at full load, the Yamato class were the biggest battleships ever built. Their 150,000-shaft horsepower engines gave them a top speed of 27 knots, and their nine 18.1-inch guns were the largest guns ever fitted on such a ship. Each 18.1-inch projectile weighed 3,200 pounds. The guns were protected by 26-inch armor on their turret faces and 16 inches of armor backed by 1 inch of high-tensile strength steel inclined at 20 degrees on the main belt. Deck armor was as thick as 9 inches.

Secondary armament consisted of 12 6.1-inch guns, 12 5-inch guns, 24 25-mm guns and four 13.2-mm guns. Despite the power, the anti-aircraft battery was severely crippled by an inadequate fire control system. This later proved a decisive factor in their destruction.

The Yamato and its sister ship, the Musashi, both carried seven aircraft that were intended for both scouting and long-range shell spotting.


USS Nevada

INTERIM ARCHIVES/GETTY

These ships were huge, measuring 862 feet 10 inches long with a 127-foot, 7-inch beam and a 34-foot 1-inch draft. They were so big that arrows were painted on them showing directions for the 2,767-man crew. Their size made them very stable with no pitch or roll at sea.

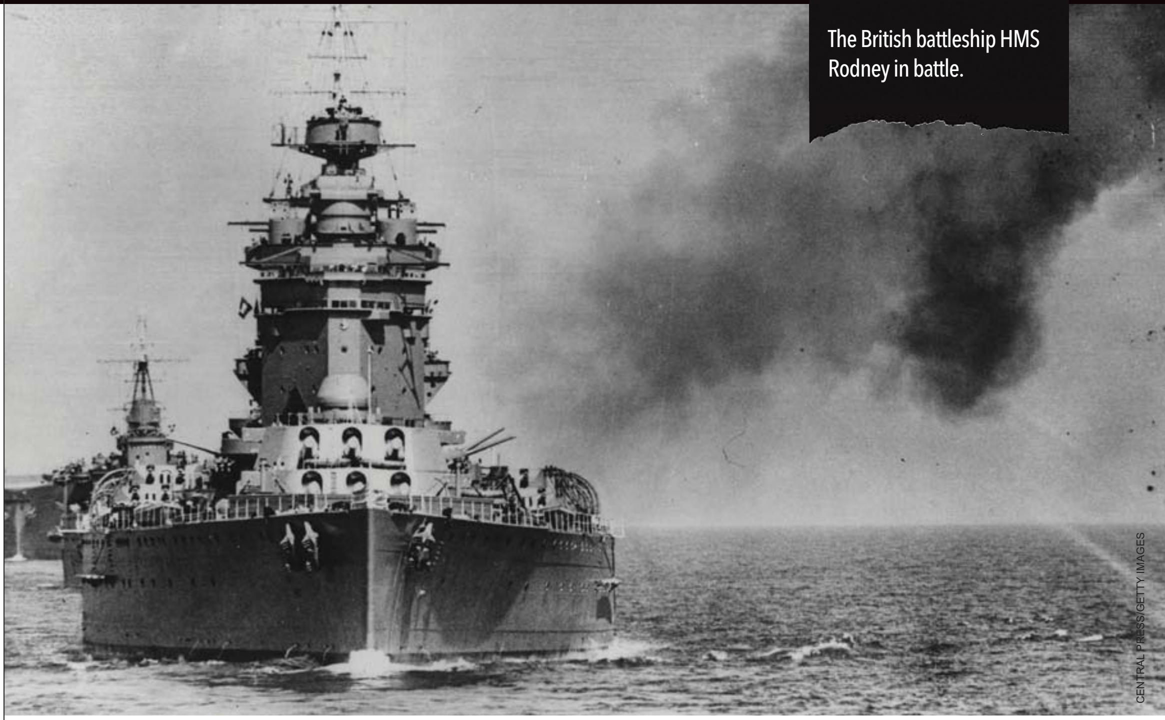
During a suicide mission on April 7, 1945, the Yamato was sunk after being attacked by aircraft. Previously, the Musashi took 19 torpedo strikes and 17 bombs before sinking on Oct. 24, 1944. This occurred during the battle of Leyte Gulf.

AMERICA'S IOWA CLASS

Their American rivals were the Iowa class battleships—the Iowa, Wisconsin, Missouri and New Jersey—and these were the most advanced battleships ever made.

A full crew was 2,700 men, and they weighed in at 58,000 tons fully loaded. With 212,000 SHP they could achieve 35.2 knots if lightly loaded. Built for speed as well as the ability to stand up in a battleship-to-battleship slugging match, they were longer than the Yamato class. They were 887 feet long, but they had a narrower beam (108 feet) and a deeper draft at 36 feet.

For protection, they had 19 feet 7 inches of armor on the turret fronts and a 12-inch belt backed by ¾ inches of high-tensile strength steel inclined at 19 degrees, and this belt was augmented by a 2-inch de-capping plate in front of it capable of dislodging the cap of an 18-inch artillery shell, thereby lowering its



The British battleship HMS Rodney in battle.

CENTRAL PRESS/GETTY IMAGES

penetration by 30 percent. Deck armor was up to 9 inches.

For weapons, the armament included nine 16-inch Mark 7 50-caliber guns, which were exceptionally accurate. Each one fired either a 2,700-pound Mark 8 AP projectile or a 1,900-pound Mark 13 HE projectile. Secondary armament was 20 5-inch .38 caliber guns, 80 Bofors 40-mm .56 caliber guns and 49 20-mm Oerlikon .70 caliber guns.

They also carried three spotter and scouting planes.

Fire control was state of the art and proved over and over to be more than the enemy's planes could stand up against. These ships were a far cry from the obsolete battleships with no effective anti-aircraft armament at Pearl Harbor. These were an attacking airplanes worst nightmare.

GERMANY'S BISMARCK

Perhaps the most famous battleship in the world is Germany's Bismarck.

It was basically the World War I Bayern and Baden class ship made with the advancements of the 1930s. Increasing the speed up to 30 knots required drastically increasing the shaft horsepower up to 150,170 and lengthening the ship slightly to 823 feet overall with a 118-foot beam and 31-foot draft. This increased the weight to 50,000 tons. It would have been more, but the Bismarck featured 90 percent welded construction, which was designed to save weight and increase strength. This was very innovative for its day.

The eight 15-inch guns were improved over their World War I versions. Each could fire three 1,800-pound shells a minute at 2,700 fps. Secondary armament consisted of 12 5.9-inch guns; 16 105-mm anti-aircraft guns in twin mounts, gyroscopically controlled to remain level for better fire control, regardless of what the ship was doing; 16 37-mm guns; and 20 20-mm guns.

The armor was the same as the World War I ships; it was intended only for protection against 15-inch gunfire. The turrets had 14 inches and the belt was 13 inches with deck armor up to 7 inches.

Internal compartmentation was less than other battleships but far stronger for the Germans, who preferred a lesser number of heavier compartments of thicker metal that would not fail under the weight of water or the shock loads encountered in combat. History proved them right. The British were unable to sink the Bismarck with gunfire and torpedoes.

Ironically, it only sank when its crew turned on it and scuttled it, but it didn't have to die. The Bismarck had a long list of grievances against its crew, and this never had to be a one-way voyage. When the two British cruisers started shadowing it, the proper response was to turn and sink them—not try to elude them.

When the Bismarck had blown up the Hood and sent the battleship Prince of Wales running for its life, the right thing to do was sink the Prince of Wales, not let it escape. After the battle, the Bismarck was leaking oil like an animal leaving a blood trail for the hounds. The

Toe-To-Toe

Iowa Class vs. Yamato Class

How would the Yamato class and the Iowa class ships fare in a toe-to-toe battleship fight?

SHELL FACTOR

Neither ship was immune to the other's shells, but the 2-inch decapping plate of the Iowa class main belt gave it a slight advantage over the 16-inch main belt of the Yamato class, though the turret front of the Yamato class was heavier than the Iowa's turret fronts. When a section of front turret armor intended for a Yamato-class battleship was found in Japan after WW2, it was penetrated at an equivalent of 30,000 yards in a test utilizing one of the 45-caliber 16-inch guns from the South Dakota class American battleships. While the 18-inch shell was larger, the 16-inch shell had greater sectional density, which meant increased penetration for its size.

ON TARGET SPEED

So which ship would get on target faster? The maximum rate of fire for the Yamato class was 1.5 - 1.9 rounds per minute. The actual rate of fire for the last three classes of American battleships was four rounds per minute. That was reduced to two rounds per minute after a gunner on the Battleship Washington lost a hand. In a fight, the Iowa class would be launching more than twice as many shells as the Yamato class. It would be like fighting two ships instead of one.

(Continued on next page)

next order of business should have been to return to a safe port. When the torpedo jammed its rudder, the cure was to cut through the rudder shaft inside the ship. The weight of the rudder would then cause it to drop out of the ship. If for some reason they could not cut it, then the section of the stern aft of the screws could have been severed right at the rudder shafts with explosives and allowed to fall away from the ship. Because this was outside the armored citadel, the ship would not have sunk. Either way would have allowed the ship to steer with the props and return safely to Brest.

In the final battle, the British succeeded in knocking out the Bismarck's main guns, but all their shells and torpedoes were unable to sink the German ship. It only went down when the crew scuttled it because they thought they might be boarded. In reality, that was a ridiculous idea because fighting in the labyrinth of a battleship would cost more lives than the British could spare. Had the crew stayed at their battle stations and fought to save the ship, they would have all survived.

The British were leaving because every U-boat in that part of the Atlantic was on the way to the battle. They didn't think the Bismarck could make port, but a seagoing tug had already been dispatched to tow the Bismarck home. Even the last torpedo attack by the British could have been foiled if the anti-aircraft gunners had not already abandoned ship, allowing the British cruiser to come as close as it wanted.

The British didn't gain any honor by their conduct in the battle either. Despite having a fleet of ships, they were so afraid of the Bismarck that they wouldn't start the battle until they had harried the Bismarck all night with destroyer attacks, depriving the crew of sleep and insuring that they would be too tired to operate the Bismarck's stereoscopic rangefinders at peak efficiency.

After the battle, they only rescued a few trophy prisoners and left the rest to drown, confirming the German belief that the British deliberately would leave Germans to drown after a British victory as they had on so many previous engagements.

FRANCE'S RICHELIEU CLASS

The French Richeleu class was intended to fight Italian battleships.

This was a first for the French Navy; except for a short period when the first French ironclad was launched, the English always had better battleships than the French.

The Richelieu and its sister ship, the Jean Bart, were unusual ships with their eight 15-inch guns both mounted forward in two quadruple turrets; this was the epitome of the French Navy's tradition of warships with a "fierce face." Secondary armament was 12 4-inch guns, 16 37-mm and 28 13.2-mm for these ships, which had a crew of 1,552 men.

They were 48,000-ton ships, 813.2 feet long with a 108-inch beam and a 31.6-inch draft. Their 150,000 SHP provided a top speed of 30 knots, and they carried three seaplanes.

The armor was 17 inches on turret fronts, 13 inches at 15-degree slope belt and up to 6.7-inch deck armor.

Show of Power

1

The battleship was able to absorb punishment, as exemplified by the Bismarck's refusal to sink under 16-inch shellfire and torpedoes.

2

The power and might is illustrated by the Bismarck when it blew the pride of the British Navy, the Hood, out of the water with a single hit.

3

During World War II, the modern American battleships proved an impenetrable defense against attacking aircraft trying to get past them to the aircraft carriers. The battleships lit up like a Christmas tree with anti-aircraft fire and suddenly the plane was gone.

The USS Missouri is shown during her shakedown cruise in August 1944.

PHOTOQUEST/GETTY

(Continued from previous page)

OPTICS

While the optical sights on the Yamato class were the largest and best in the world, the fire control was inferior to the Iowa class, which integrated radar more effectively and did not care what fancy maneuvering the ship was doing while it was directing the fire. The Iowa class battleships had the finest fire control in the world.

ACCURACY

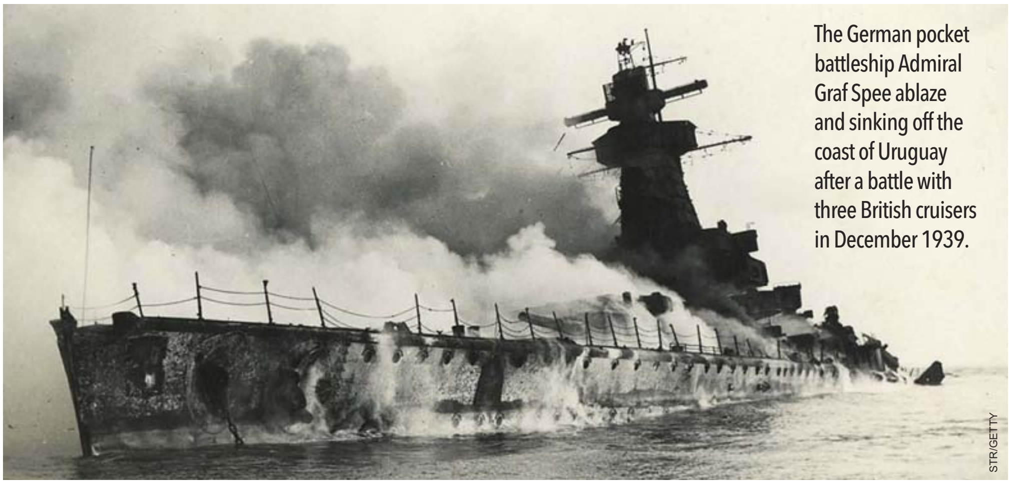
Finally, while the Yamato class 18.1-inch guns had good accuracy, the Iowa class 16-inch guns had extraordinary accuracy. The odds favor the Iowa class ship overwhelming the Yamato class ship in an artillery duel.

BUOYANCY

The Reserve buoyancy is critical when you are taking hits, and the Yamato class could be considered an enlarged Japanese version of the South Dakota class of battleship that preceded the Iowa class. Both of these classes suffered from a lack of reserve buoyancy, which the Americans corrected in the Iowa class. The Yamato class ships could not survive even a small amount of flooding inside the armored citadel once the unarmored sections were flooded. The water-tight compartmentation of the Japanese ships was up to British standards that were not as stout as American standards and proved inadequate under combat conditions. The Iowa class could take much more battle damage and stay afloat. The American damage and fire suppression systems were also more highly developed than the Japanese.

AND THE WINNER?

So baring a lucky hit, the odds favor the Iowa class over the Yamato class in a classic battleship knock down drag-out-fight.



The German pocket battleship Admiral Graf Spee ablaze and sinking off the coast of Uruguay after a battle with three British cruisers in December 1939.

STR/GETTY

Like the rest of the French military, these ships did not play a major part in the war.

BRITAIN'S KING GEORGE V CLASS

The last British class of battleship to see service in the war was the King George V class.

The preceding class of battleships with 16-inch guns had been a failure because the extreme measures to keep the weight of the ships under the weight limits of the London Naval Treaty had resulted in a ship that warped and twisted under the immense recoil of it's 16-inch guns. Structural damage was appalling and the two ships, the Rodney and the Nelson, were hurriedly scrapped as soon as the war was over.

The King George V class was also a failure in service because it's poorly designed and manufactured 14-inch gun turrets were out of action at regular intervals once they started firing. These were the only battleships in history that couldn't keep their turrets working and firing in combat.

They weighed 42,923 tons, they were 745 feet long, 103 feet wide and drew 34 feet. Their meager 110,000 SHP provided a top speed of 28 knots.

Armament was 10 14-inch guns in a quad turret fore and aft with a single twin gun turret forward. Maximum rate of fire was only 2 rounds per minute. Secondary armament was 16 5.25 inch, 64 40mm, and 36 20mm. They also carried four seaplanes and a crew of 1,422 men.

Armor was 12 ¾-inch turret fronts, 14.7-inch belt, and 5 -6-inch deck.

ITALY: THE LITTORIO CLASS

The Littorio class of Italy saw mostly convoy duty in World War II.

When Italy surrendered, the Germans attacked the three ships of this class with Fritz X radio guided bombs that damaged the Littorio and Vittoria Veneto and sank the Roma.

These were 45,000-ton ships, 789.6 feet long with a 107.7-foot beam and a 31-foot draft. They carried 1,830 men and three seaplanes. The 128,000 SHP provided 31 knot speed, and they were armed with nine 15-inch guns in three triple turrets with each gun having a rate of fire of one shot every 45 seconds. That was fine for World War I but ridiculously slow for World War II.

Secondary armament was 12 6-inch guns in four triple turrets, four 120-mm, 12 90-mm, 20 37-mm and 16 20-mm.

Turret front armor was 14 inches, deck armor up to 6.4 inches and there was a complicated layered and spaced main belt armor of dubious value. The main belt was inclined 11 degrees.

There was a 2.8-inch decapping belt 9.8 inches in front of the main belt. The belt was backed with 2-inch wooden boards and then 1 inch of steel. There was a 5.5-inch gap and a 1.4-inch splinter screen followed by another 5.5-inch gap and a final 1.4-inch splinter screen.

Like the French battleship Richeleu, the Italian Littorio was more than a match for the British King George V ships. It had bigger guns, and it's gun turrets always worked. It's lucky for the British that their last battleship design to see service in World War II didn't have to fight either of these opponents.

BATTLESHIP SLOW DOWN

World War II, some 70 years ago, was the last major development of the battleship. After the war, the only naval power big enough to afford them was the U.S., and interservice rivalries within the navy have forestalled that. **WOW**

Jim Dickson has written for the gun magazines in 12 countries for nearly 30 years.

Tale of the Tape

Weight Comparison

Yamato Class	73,000 tons
Iowa Class	58,000 tons
Bismarck	50,000 tons
Richelieu Class	48,000 tons
George V	42,923 tons
Littorio	45 tons

Top Speed

Yamato Class	27 knots
Iowa Class	35.2 knots
Bismarck	30 knots
Richelieu Class	30 knots
George V	28 knots
Littorio	31 knots

Thick "Skin"

On Japan's Yamato Class, 26-inch armor protected the 18.1-inch projectiles.

Show of Firepower

The Yamato Class featured 18.1-inch guns, and each projectile weighed 3,200 pounds.

Did You Know?

Battleships in the Yamato class were so big that arrows were painted on them that provided directions for the crew.

How Technology Impacted Battleships

During this conflict, there was a high development of this weapon of war, in areas such as hull shape and propeller design, which were more refinements than new technologies.

The innovative and infamous German battleship Bismarck.

ULLSTEIN BILD/GETTY

ANYTHING THAT FLOATS

All Types of Watercraft Were Needed During the War Effort

Much deserved credit for the Allied victory at sea during World War II is given to the aircraft carriers, battleships and submarines. But vessels of all types played important roles in the outcome of the war. Here are just five:

1. VICTORY SHIPS

There were the Victory cargo ships—more than 500 built by the U.S. in World War II—that carried much-needed supplies from the U.S. to Europe and to the far reaches of the Pacific. These ships were priority targets for the German and Japanese.

Quick Specs: Victory Ships
Number built: Approximately 530
Displacement: 15,200 tons
Length: 455 feet
Beam: 62 feet
Speed: 15 to 17 knots
Armament: One 5-inch gun; one 3-inch gun; eight 20-mm anti-aircraft guns; one 40-mm anti-aircraft gun; and two M2 .50-caliber machine guns
Crew: 90 (62 civilians, 28 naval personnel)

2. DESTROYERS

It was our destroyers who were often called upon to escort convoys of cargo and troop ships through dangerous waters. Fast and maneuverable, their original purpose was to hunt torpedo boats and submarines, but they were soon enlisted for many other duties. The most common U.S. destroyer was the Fletcher Class, with about 150 in service during the war.

Quick Specs: Fletcher Class Destroyers
Number built: 175
Displacement: 2050 tons
Length: 376 feet
Beam: 39 feet
Speed: 36 knots
Armament: Five 5-inch guns; 10 21-inch torpedoes; six 40-mm anti-aircraft guns; six depth charge projectors; two depth charge racks
Crew: 329

An American LCVP (landing craft, vehicle, personnel) approaches Omaha Beach, Normandy, as part of the D-Day invasion on June 6, 1944.

GALERIE BILDERWELT/GETTY IMAGES

3. CRUISERS

We had light cruisers with their six-inch guns and the heavy cruisers with their eight-inch guns. They were limited to 10,000 tons displacement by treaty before the war, but increased in size during the conflict. They were larger than the destroyers, but smaller than the huge battleships. These were fast, long range ships that could patrol, escort or mobilize wherever they were needed.

Quick Specs: Baltimore Class Heavy Cruisers
Number built: 17
Displacement: 14,500 tons
Length: 673 feet
Beam: 71 feet
Speed: 33 knots
Armament: Nine 8-inch guns among three turrets; 12 5-inch guns; 48 40-mm anti-aircraft guns; 20 20-mm canons
Crew: nearly 1,100

4. MOSQUITO FLEET

Around coastal waters and in and out of the islands in the Pacific, the patrol torpedo boat—PT boat for short—proved invaluable as pesky attack boats disrupting enemy supply lines and troop movements. Each was equipped with two to four 2,600-pound torpedoes and twin .50-caliber anti-aircraft machine guns.

Quick Specs: Patrol Torpedo (PT) Boats – PT103 Class
Number built: 525 (all classes)
Displacement: 56 tons
Length: 80 feet
Beam: 20 feet
Speed: 41 knots
Armament: Four 21-inch torpedoes; one 20-mm canon, four M2 .50-caliber machine guns; some boats also fitted with a 37-mm anti-tank gun
Crew: 17

5. LANDING CRAFT

Though not ships in the conventional sense, these flat-bottomed boats with ramped or wide-opening front ends were critical in getting troops and vehicles from ship to shore. They ranged in size from those able to transport two or three dozen soldiers to ones that were able to offload several tanks. Some of the more common ones included the Landing Craft Assault (LCA), Landing Craft Infantry, Landing Craft, Tank (LCT)

Quick Specs: Landing Craft, Tank (LCT) Mk 6
Number built: 965
Displacement: 264 tons
Length: 119 feet
Beam: 32 feet
Speed: 7 knots
Armament: Two 20-mm anti-aircraft guns; four .50-caliber machine guns
Crew: 12 **WOW**

AVRO ★ LANCASTER

CREW

7

LENGTH

69 feet, 4 inches

WINGSPAN

102 feet

MAX SPEED

282 mph at 63,000 pounds

RANGE

2,530 miles

BOMBS

Normal load–14,000 pounds or 22,000-pound Grand Slam

GUNS

In nose turret, two Browning .303 Mk II machine guns; in upper turret, two Browning .303 Mk II machine guns; in rear turret, four Browning .303 Mk II machine guns

British soldiers load bombs onto a RAF AVRO Lancaster Bomber during World War II. (Photo by Fox Photos/Getty Images)

★ vs. B-17

CREW

10

LENGTH

74 feet, 4 inches

WINGSPAN

103 feet, 9 inches

MAX SPEED

287 mph

RANGE

2,000 miles

GUNS

13 .50 caliber M2 Browning machine guns

BOMBS

Short-range Missions:

8,000 pounds

Long-range Missions:

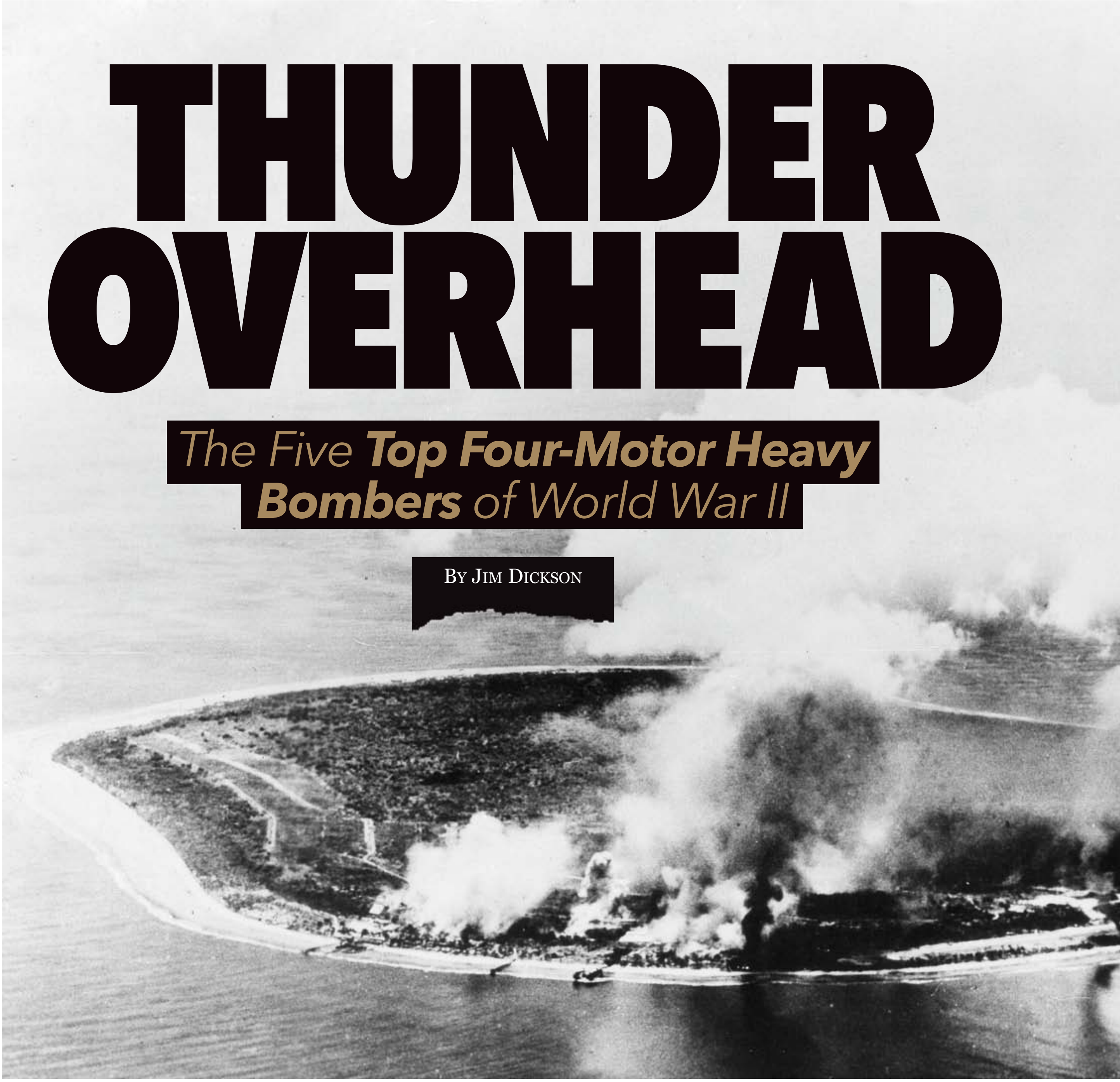
4,500 pounds

Two American gunners from a B-17 Flying Fortress crew prepare for a bombing mission over Germany in 1944. (Photo by Keystone-France/Gamma Keystone via Getty Images)

THUNDER OVERHEAD

The Five **Top Four-Motor Heavy Bombers** *of World War II*

By Jim Dickson



They brought destruction from above.

As a result of these four-motor bombers, World War II was the first war in which air power was a decisive factor. Following are five of the most prominent bombers of the war.

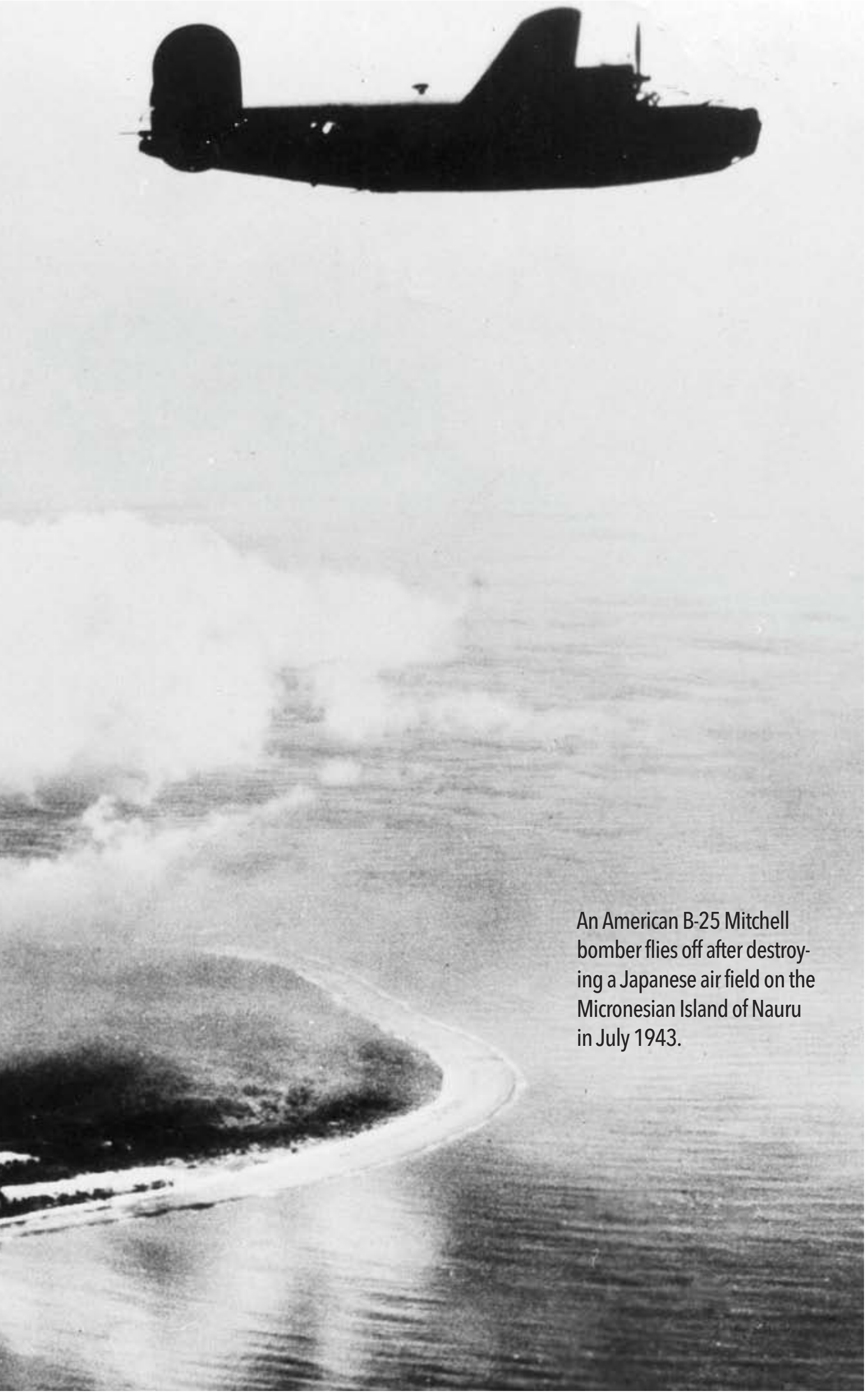
BOEING B17

A singularly beautiful plane, the B17 flew over 290,000 sorties and dropped 640,000 tons of bombs during the war, more than any other bomber in the war.

Its beauty was not just skin deep but all the way through. This plane was stable and responsive to fly and could take more battle damage than anyone could imagine and still limp home. Its crews grew to love and trust it. If anyone ever judged a plane for a plane's sake and not for a specific purpose, the B17 would rank as the all time greatest aircraft ever made.

Some of the well-documented feats of the B17 defy belief. Planes came home with most of the tail shot off. One plane was almost cut in two by a collision with a German ME109 yet still made it home. Battle damage exceeding anything ever seen before or since was found on airplanes that somehow hobbled home.

Some of the stories seem straight out of the "Twilight Zone." One plane came back to England and landed itself in a field minus its entire crew! Another plane landed at its base with the rest of the returning bombers but no one got off. The only man



An American B-25 Mitchell bomber flies off after destroying a Japanese air field on the Micronesian Island of Nauru in July 1943.

TIME AND LIFE PICTURES/GETTY

alive turned out to be the unconscious belly gunner still in his ball turret. The B17 strictly earned everyone's respect.

The B17 was christened "The Flying Fortress" by a reporter when the prototype was first rolled out in 1935. Before it was through, the B17 would set the record for the highest production rate for large aircraft and serve in every World War II combat zone.

Continually improved in service, the final version, the B17G, carried 13 .50 caliber machineguns. The bombers flew in a staggered box formation so that any plane attacking would end up fired upon by multiple bombers.

Powered by four 1,200 HP Wright Cyclone radial engines, the B17G could go to a maximum speed of 350 mph. Maximum range with bomb bay tanks bringing the total fuel carried to 3,600 gallons was 3,750 miles. Maximum ceiling was 37,500 feet and the maximum bomb load was 12,800 pounds.

This is no small plane. Its wingspan is 103 feet, 9.38 inches. It is 74 feet, 8.90 inches long and 19 feet, 1 inch high.

There were those who remembered the B17G in the wars following World War II and wished for it as a close air support weapon, but the Air Force is like a spoiled kid who always wants a new toy and is eager to discard an older one.

Having a B17G flying lazy circles in Viet Nam with every .50 caliber MG gunner looking for targets of opportunity on the ground while dropping napalm on any large target was the unrealized dream of many a ground pounder in the rice paddies.

It would have been far more effective than the DC3s with the electric motor driven Gatling guns that were employed, and if you wanted to put those guns on a B17 you would have been able to carry a whole lot more ammo for them than you could on a DC3.

Today that job is done by C130A Hercules Gunships, which also carry a 40 mm and a 105 mm cannon as well as bombs. Still, a B17 with just bombs and machine guns makes a much smaller target for return fire, and the plane costs a lot less than a C130 to build. Sometimes old technology is best.

THE B29 SUPERFORTRESS

Boeing followed up the B17 with the B29, famous for its long range napalm bombing of Japan and for dropping the first two atomic bombs on Hiroshima and Nagasaki, which ended the war.

It also mined the Japanese ports and shipping routes in Operation Starvation. This was a monster of a plane by all previous standards. Its empty weight was 69,610 pounds and its maximum gross weight was 120,000 pounds.

It was powered by four Wright Cyclone R-3350 twin row radial 18-cylinder engines, each putting out 2,200 hp at 2,600 rpm. These were state-of-the-art aircraft engines like nothing seen before. They gave a maximum speed of 365 mph and a cruising speed of 220 mph. It still was a sweet flying bird and had a low landing speed of 79 mph. It had a maximum range of 5,830 miles on 5,000 gallons of fuel and a maximum ceiling of 33,500 feet.

Between 1943 and 1945, 3,970 were built. This was the first high-tech, really expensive bomber. It was the first pressurized bomber and the first with remote controlled turrets with a computerized aiming system.

All machine guns were aimed electronically from five sighting stations located in the nose, tail and three Plexiglas blisters. Five General Electric analog computers, one for each sight, compensated for airspeed, lead, gravity, temperature and humidity.

A single man could operate two or more turrets, including the tail guns at the same time. The gunner in the upper position acted as the fire control officer. The Japanese quickly learned to fear this new plane and its super accurate defensive firepower of 12 .50 caliber machine guns.

After the war, the motors were changed to the Pratt & Whitney R-4360 "Wasp Major." The B29 continued in service through the Korean War, dropping 180,000 tons of bombs and shooting down 27 commie aircraft. It was vulnerable to the new MIG15 jet fighters flown by Russian pilots for the North Koreans.

The politicians in Washington kept the fact that all the enemy jets were piloted by Russian Air Force pilots from the public for many decades.

After Korea it soldiered on, although it played second fiddle to the giant Convair B36. The last ones weren't retired from service until the 1960's. It is worth noting that both the B17 and the B29 were direct ancestors of the vaunted Boeing B52, the longest serving bomber in history.

THE B24 LIBERATOR

There was another American four-motor bomber in World War II, but this one was not loved by its crews who dubbed it "The Flying Coffin" or alternately "The Flaming Coffin."

The Consolidated B24 Liberator was not a good plane to be in when you started taking battle damage. The interior of this death trap was cramped and hard to traverse with the only entrance and exit at the rear. It was almost impossible for the flight crew and the nose gunner wearing parachutes to get down the extremely narrow catwalk from the flight deck to the rear exit in time to bail out before the plane hit the ground.

The B24 had the high aspect-ratio Davis wing that increased fuel efficiency and range at the price of durability. It had 25 percent less wing area than a B17 and 35 percent higher wing loading. It could not lose much wing surface area and continue to fly, and structural damage often meant the wing coming off and no chance for the crew to survive.

The B24 lacked the refined flying characteristics of the B17 and was much more difficult to fly having heavy control forces and poor formation flying characteristics. It flew 23,000 feet lower than a B17 making it a better anti-aircraft gun target.

The B24 had 10 of the .50 caliber machine guns instead of the 13 of the B17G. The B24 was a lot easier to set on fire than a B17 and a lot safer for German pilots to attack. It quickly became the target of choice for the Luftwaffe.

It remained a potential flaming coffin even on the ground. During fueling the fumes would build up inside the plane so much that the bomb bay doors would have to be cracked opened to let the fumes out. Not a good place for a spark

The plane had such a high accident rate it quickly became known as a widow maker. Far weaker than the B17, it tended to break up on belly landings or when ditched in the ocean and was prone to turn into a flaming coffin at these times.

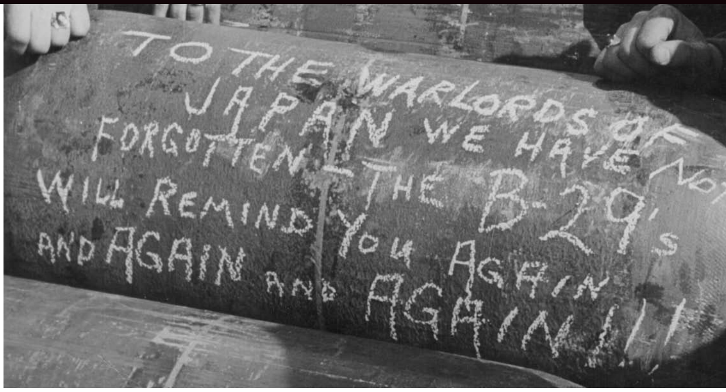
Despite having 1,200 hp Pratt & Whitney engines, it was a slow bomber that flew at a top speed of only 290 mph and cruised at a mere 175, giving new meaning to the term "sitting duck."

The U.S. bought 18,000 of these death traps and used them in every theatre of the war at a price paid in the lives of American airmen.

AVRO LANCASTER

Britain's big bomber of the war was the Avro Lancaster of which 7,377 were built. It was another deathtrap for the crews because like the American B24, you could hardly bail out of it in time when it started going down. Indeed only 15 percent of the crews of planes that went down succeeded in bailing out.

GETTY IMAGES


TO THE WARLORDS OF JAPAN WE HAVE NOT FORGOTTEN–THE B-29's WILL REMIND YOU AGAIN AND AGAIN AND AGAIN!!!

U.S. Marines write a message on the side of a bomb, "To the warlords of Japan, we have not forgotten–the B-29's will remind you again and again and again!" during the Pacific Campaign of World War II, Saipan, circa 1939-1945.

EUROPEAN/FPG/GETTY IMAGES

It carried a pathetic armament of only eight .303 machine guns and was an easy target for flak guns and fighters. The British used it mostly in night bombing raids focusing primarily on German civilians, dropping 608,612 long tons of bombs in 156,000 sorties.

Its long, unobstructed bomb bay enabled it to carry the 22,000-pound Grand Slam earthquake bomb, the largest conventional bomb of World War II. It also dropped the "Bouncing Bomb" on the Ruhr Valley dams.

Its four 1,280 hp Rolls-Royce Merlin liquid cooled engines gave it a maximum speed of 287 mph and a cruising speed of 200 mph with a range of 2,530 miles. Its service ceiling was only 19,000 feet, which was within the range of flak guns.

FOCKE-WULF FW200 CONDOR

Germany's four-motor bomber started out as a Trans-Atlantic airliner in 1937. It was pressed into duty as a bomber when the war began. Though this is definitely not the right way to make a bomber, the Condor did very well under the circumstances.

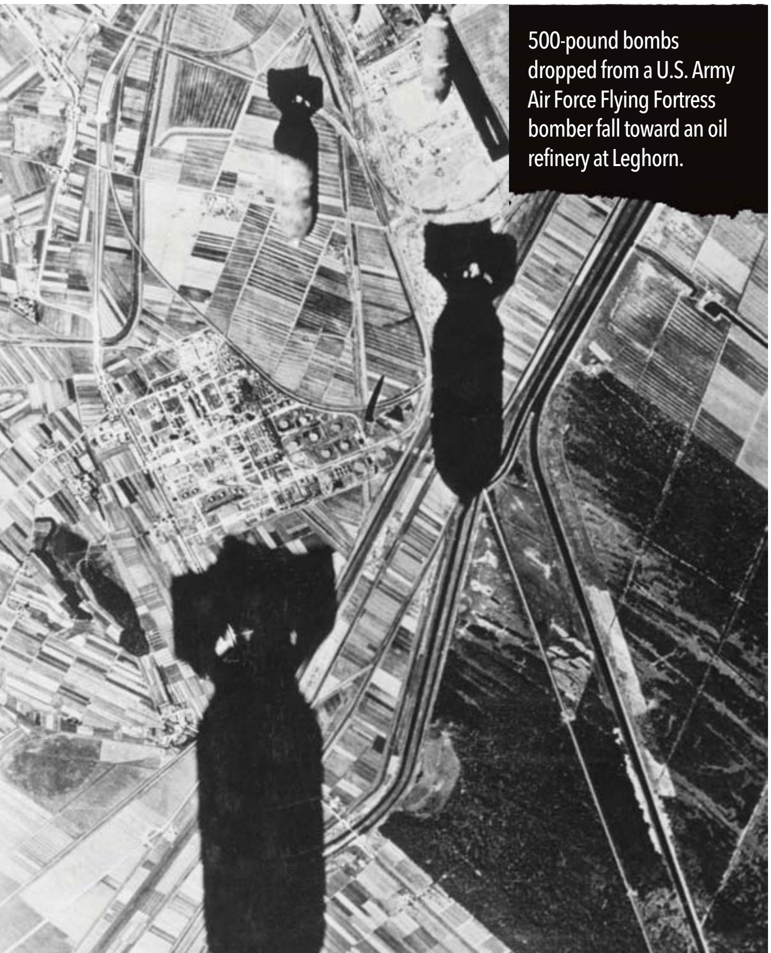
The Condor had very long wings for commercial flights at 9,800 feet and could cruise at 208 mph at 13,100 feet. Powered by four 1,200 hp BMW/Bramo 323R-2 nine-cylinder single row air cooled radial engines, it had a range of 2,212 miles and a service ceiling of 19,700 feet.

It carried one 20 mm MG151/20 cannon in the forward gondolier and four 13 mm MG13s in waist and dorsal positions plus 11,905 pounds of bombs.

Churchill called them "The scourge of the Atlantic" because they sank 365,000 tons of shipping. The Condor would swoop in low and bracket the target with three bombs, a most deadly method of attack. Vulnerable to fighter attack, the use of escort carriers caused their use against shipping to end in mid 1941.

They remained effective as night bombers and saw wide use as transport aircraft. For a commercial airliner pressed into military service it did far better than anyone had a right to expect. **WOW**

Jim Dickson has written for the gun magazines in 12 countries for nearly 30 years.



500-pound bombs dropped from a U.S. Army Air Force Flying Fortress bomber fall toward an oil refinery at Leghorn.

KEYSTONE/GETTY IMAGES

THE JAPANESE ZERO ★

OPERATIONAL

1940-1945

THE NAME

Pilots called the A6M the Reisen (zero fighter). The 0 was the last digit of the Imperial year 2600, which is when the plane entered service.

CREW

1

LENGTH

29 feet, 9 inches

KILL RATIO

12-1

KEY ATTRIBUTES

Long range and outstanding maneuverability

RANGE

1,929 miles

SPEED

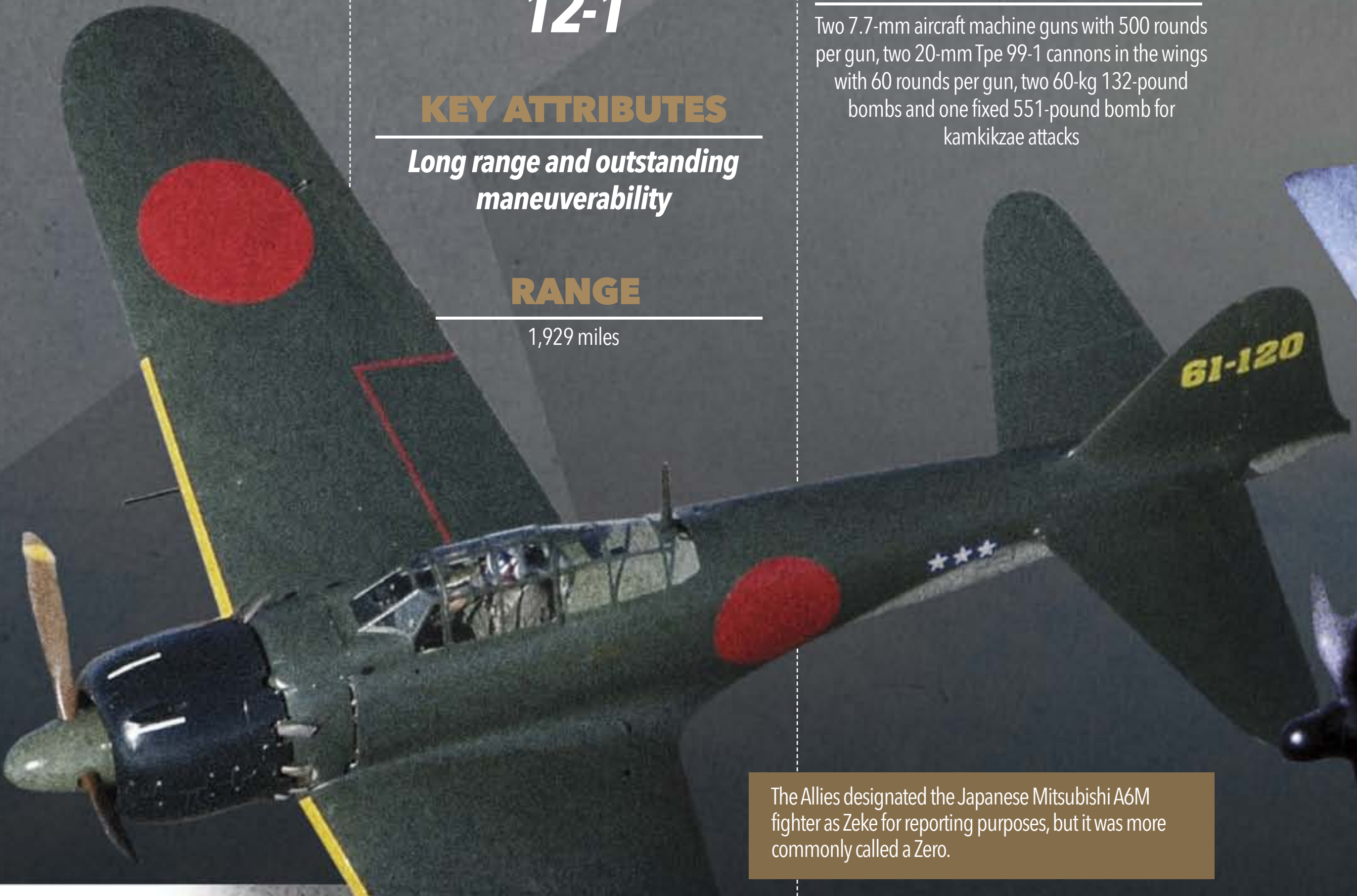
331 mph

CLIMBING RATE

3,100 feet per minute

ARMAMENT

Two 7.7-mm aircraft machine guns with 500 rounds per gun, two 20-mm Tpe 99-1 cannons in the wings with 60 rounds per gun, two 60-kg 132-pound bombs and one fixed 551-pound bomb for kamkikzae attacks



The Allies designated the Japanese Mitsubishi A6M fighter as Zeke for reporting purposes, but it was more commonly called a Zero.

★ VS. U.S. HELLCAT

OPERATIONAL

1942-1945

CREW

1

LENGTH

33 feet, 7 inches

KILL-TO-LOSS RATIO

19-1

AIRCRAFT DESTROYED

5,223

KEY ATTRIBUTES

Rugged and well-designed, bullet-proof windshield

RANGE

945 miles

SPEED

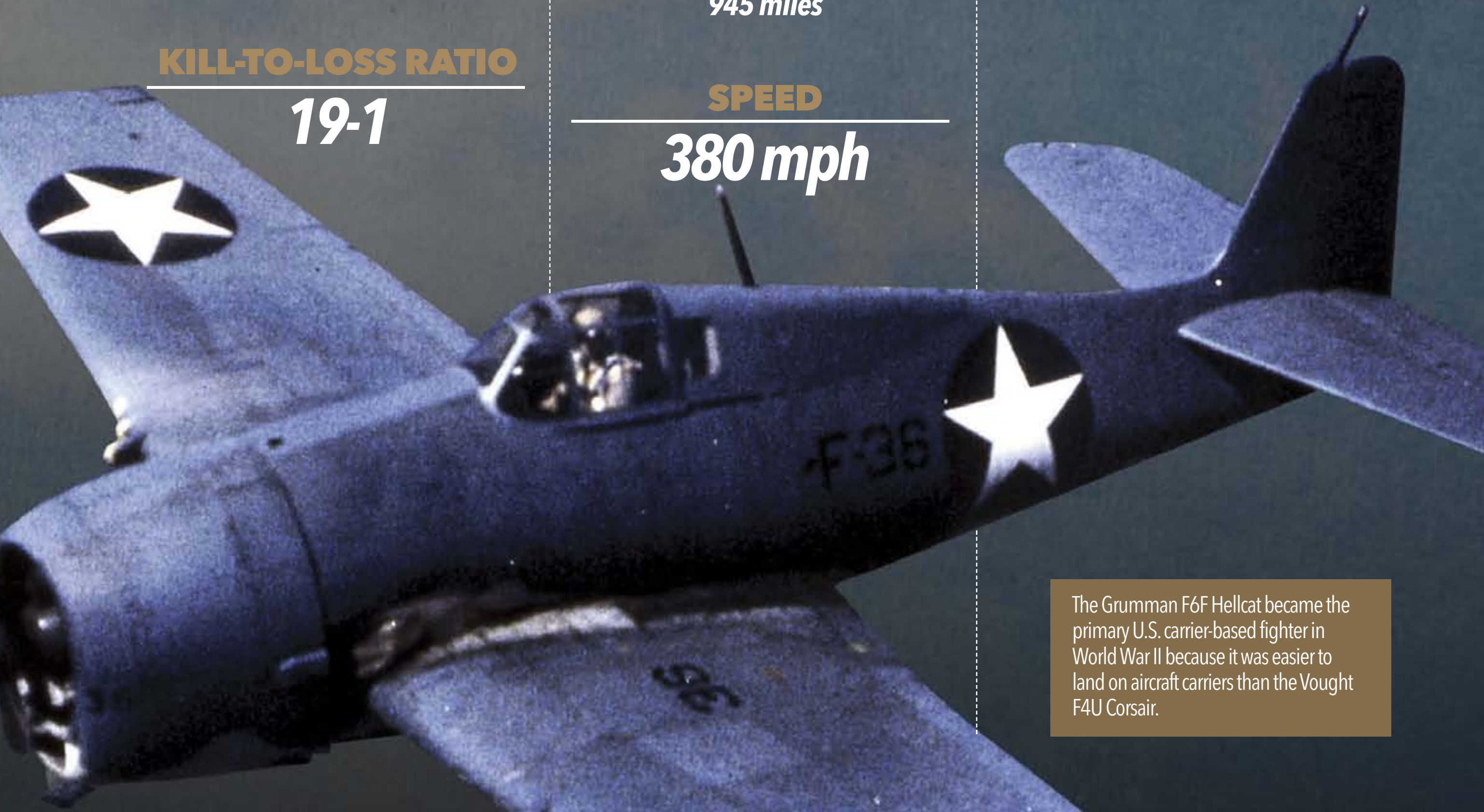
380 mph

CLIMBING RATE

3,500 feet per minute

ARMAMENT

Six 12.7-mm M2 Browning machine guns with 400 rounds per gun or two 20-mm cannons with 225 rounds per gun; four 12.7 Browning machine guns with 400 rounds; 6x5 HVARs or two 11¾-inch unguided rockets; one 2,000-pound bomb or one Mk. 13-3 torpedo; two 1,000-pound underwing bombs; and four 500-pound bombs or eight 250-pound bombs

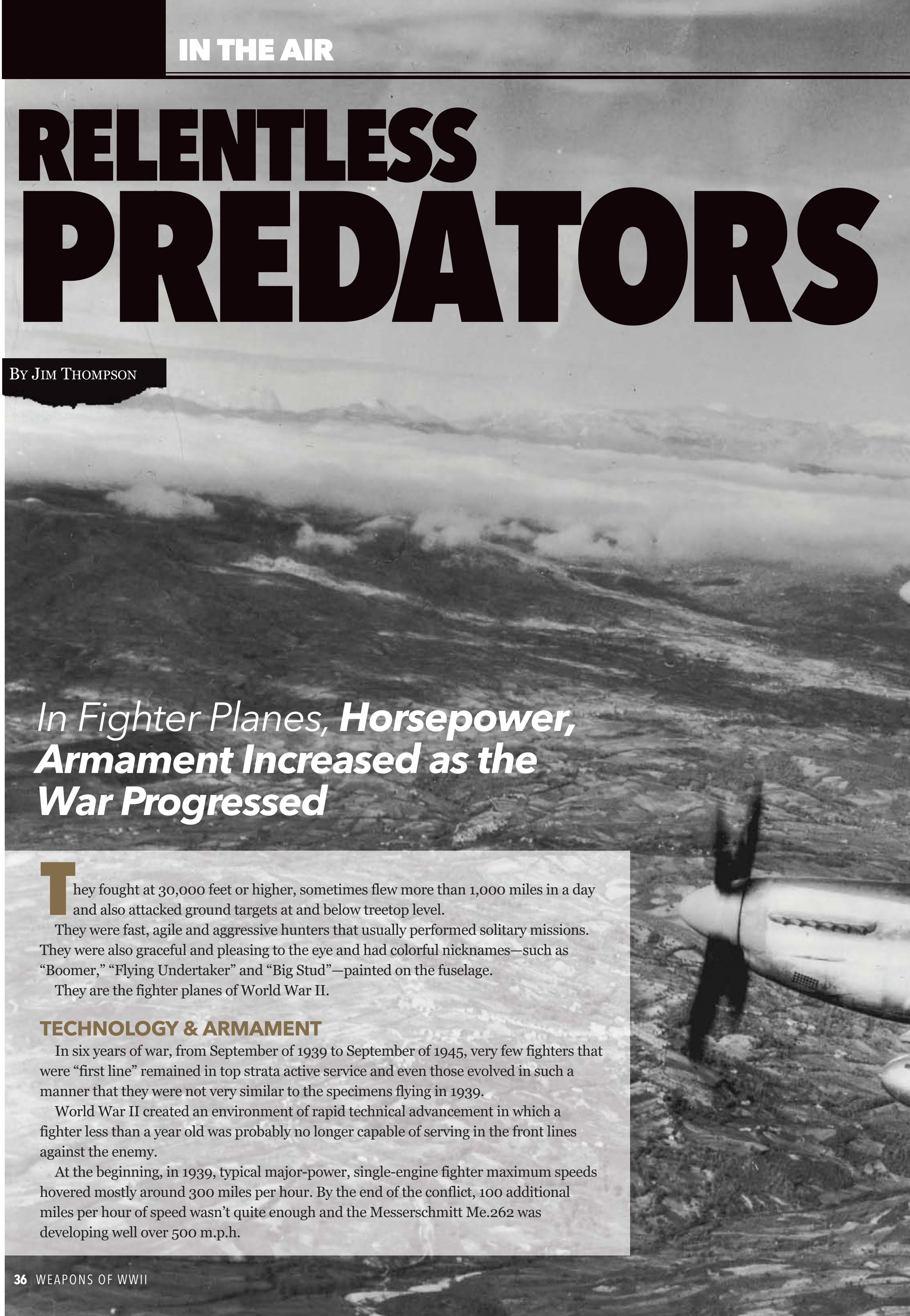


The Grumman F6F Hellcat became the primary U.S. carrier-based fighter in World War II because it was easier to land on aircraft carriers than the Vought F4U Corsair.

GETTY IMAGES

RELENTLESS PREDATORS

By Jim Thompson



In Fighter Planes, ***Horsepower, Armament Increased as the War Progressed***

They fought at 30,000 feet or higher, sometimes flew more than 1,000 miles in a day and also attacked ground targets at and below treetop level.

They were fast, agile and aggressive hunters that usually performed solitary missions. They were also graceful and pleasing to the eye and had colorful nicknames—such as "Boomer," "Flying Undertaker" and "Big Stud"—painted on the fuselage.

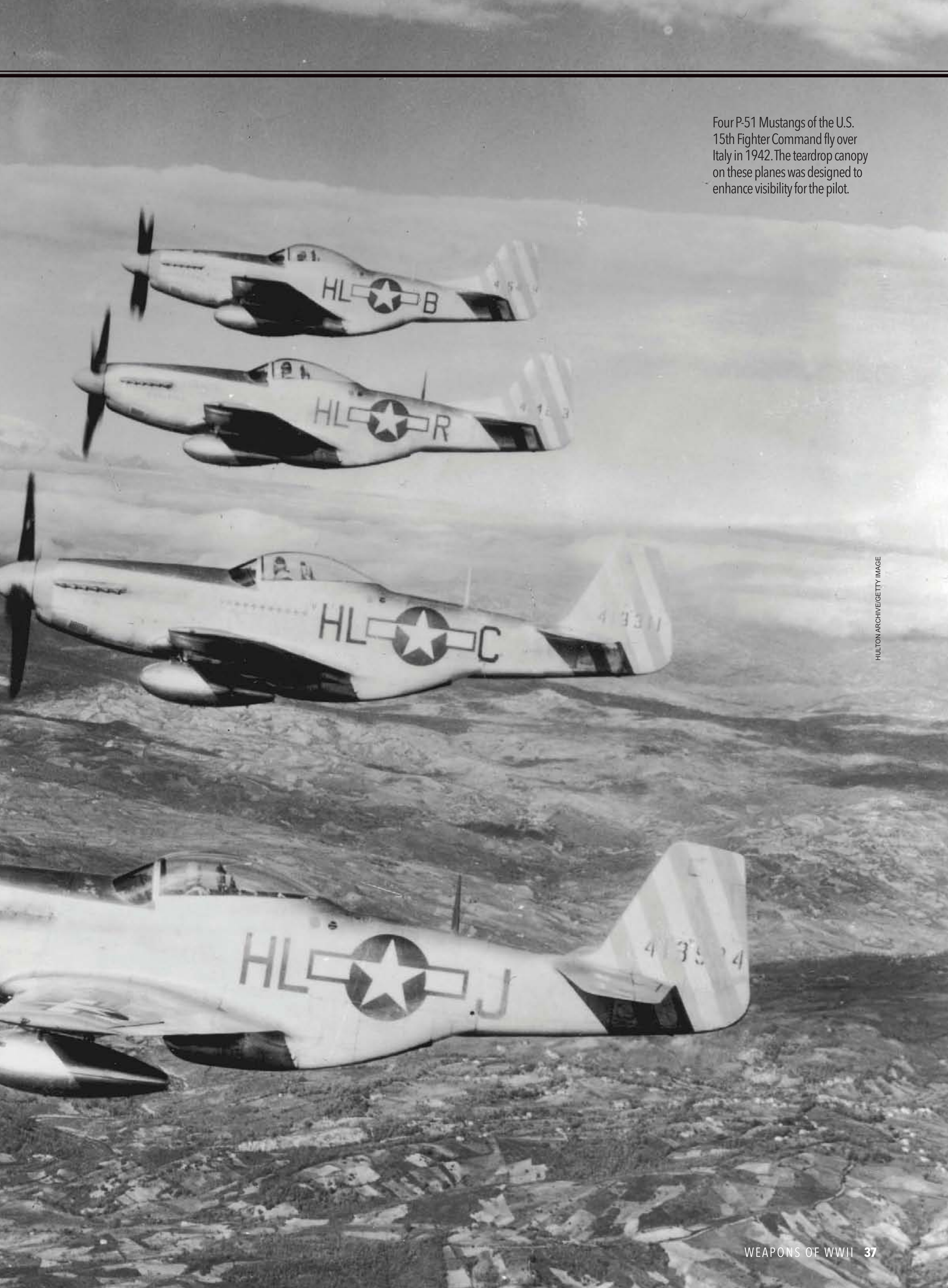
They are the fighter planes of World War II.

TECHNOLOGY & ARMAMENT

In six years of war, from September of 1939 to September of 1945, very few fighters that were "first line" remained in top strata active service and even those evolved in such a manner that they were not very similar to the specimens flying in 1939.

World War II created an environment of rapid technical advancement in which a fighter less than a year old was probably no longer capable of serving in the front lines against the enemy.

At the beginning, in 1939, typical major-power, single-engine fighter maximum speeds hovered mostly around 300 miles per hour. By the end of the conflict, 100 additional miles per hour of speed wasn't quite enough and the Messerschmitt Me.262 was developing well over 500 m.p.h.



Four P-51 Mustangs of the U.S. 15th Fighter Command fly over Italy in 1942. The teardrop canopy on these planes was designed to enhance visibility for the pilot.

HULTON ARCHIVE/GETTY IMAGE

Italian Fighters

Tight-Turning & Nimble

Italian Fighters, especially those of Fiat and Macchi-Castoldi, were philosophically akin to the Japanese concept. They were tight-turning, rapid-accelerating fighters.

Veteran combat pilots assessing them after the war described them as "fun" and "cat-like." An old Spitfire veteran from the Battle of Britain said the MC.205 "probably could've out-turned" any mark of Supermarine Spitfire and was at least as fast.

There were never enough of them, though, and the Regia Aeronautica had not planned for a long war of attrition.

INTERIM ARCHIVES/GETTY IMAGES

CHARLES E. BROWN/ROYAL AIR FORCE MUSEUM/GETTY IMAGES

ABOVE: A formation of American P-51 Mustang fighters is silhouetted against the sky on a flight over Italy in March, 1945.

BELOW: British Supermarine Spitfire Mk IX fighters of the 611 Squadron in flight in December 1942.

Among fighters whose types remained active for the entire period, airframes such as the Supermarine Spitfire and the Messerschmitt Bf.109 doubled their horsepower from about 1,000 horsepower to roughly twice that, similarly increasing their gross takeoff weights, fuel capacity and armament.

Common armament early in the war consisted of two to four rifle-caliber machine guns, a few machines featured as many as eight and very rarely, one or two heavier caliber machine guns or a single cannon, usually around 20mm bore size.

By the end of the war, rifle-caliber machine guns were almost completely extinct, with .50-caliber being about the minimum main armament. Many aircraft featured four rapid fire 20mm cannon.

Even the definition of fighter changed, albeit in the end, there is really is no uniform definition. In WWI, pursuit and scout aircraft gradually came to be called “fighters.” The pursuit aircraft is, of course, designed to chase, attack and destroy airplanes. The “scout” was never solely an observation craft. They had to be able to “scout” enemy positions, but it was also implicit from 1914 that they were also to look for enemy machines and defend themselves against “bandits.”

Not surprisingly, virtually every “fighter” saw frequent use as a photo reconnaissance machine, sometimes with modified armament, sometimes with none at all.

Very few aircraft called “fighters” were crew-served, but three in particular, the German Messerschmitt Bf.110 “Zerstorer” (destroyer), the U.S. Northrop P-61 Black Widow, and the British DeHavilland Mosquito, all twin-engined, almost always carried more personnel. The U.S. P-38, however, almost never employed a second crewman.

“INVARIABLY, WHEN WORLD WAR II FIGHTERS ARE BROUGHT UP, THE QUESTION IS ASKED, “WHICH ONE WAS THE BEST?” MOST LIKELY, THERE WAS NO SUCH THING. SOME TYPES WERE JUST SUPERIOR IN PARTICULAR ROLES.”

The German Messerschmitt Me 262 was the first operational jet to see combat.

British Fighters

Light, Elegant, Rugged

There was considerable variety among British fighters, from the light and elegant Spitfire to the rugged Hawker Typhoon fighter-bombers. The De Havilland Mosquito was probably the most successful multi-engined fighter of World War II, and was also highly rated in different versions as reconnaissance and bombing platforms.

British designers had access to excellent domestic and U.S.-produced radial engines but used very few on fighter aircraft, believing that the narrower profile of liquid-cooled V-form “inline” engines provided advantages in terms of streamlining and forward visibility. The Hawker Typhoon and Tempest were the only combat service aircraft to use 24-cylinder H-form Napier Sabre liquid-cooled engines.

U.S. Fighters

Long Range, High Performance

The two primary single-engined fighters in the U.S. Army Air Forces inventory at the time of the Pearl Harbor attack, the Bell P-39 Airacobra and the Curtiss P-40 Warhawk, were both outmoded as fighters well before the end of the war and many were scrapped. Some were handed off to other allied air forces and remaining machines were assigned to fighter bomber and training outfits.

Generally, the United States developed several fighter lines simultaneously, using both radial air-cooled and inline engines. The U.S. created aircraft capable of exceptionally long range and high overall performance levels, such as the North American P-51, as well as versatile machines such as the naval and Marine Chance-Vought F4U Corsair.

Both of those aircraft served foreign air forces long after the war. The last F4U-7 fighters for the French Aéronavale (Naval Air Arm) did not leave production until 1956. And the last combat-ready P-51’s left service in Latin America in the late 1970s.

The late P-51’s used Packard-produced Rolls-Royce Merlin water-cooled V-12 engines. The Corsairs flew almost entirely with various marks of air-cooled radial R-2800 Pratt and Whitney engines. Real performance of these two radically different designs was startlingly similar.

The P-51 was originally ordered by the R.A.F. as an Army cooperation and photo reconnaissance aircraft and for several months after the initial orders, the USAAF expressed no interest in the design. Re-engined with the high-altitude rated versions of the Rolls-Royce Merlin, of course, it became the predominant escort fighter of World War II.

Japanese Fighters

Built for Long Range

The early Japanese designs were far more radical and advanced, stressing exceptionally long range and agility, all based upon very sophisticated use of light metal alloys.

The superb, detailed training of Japanese Army and Navy pilots (they did NOT share equipment or pilots), initially a strength, became a weakness as they struggled to find a faster way to mass process recruits and never really located a satisfactory system.

When later designs such as the A6M "Zero" series were fitted with heavier armor and self-sealing tanks, the weight increases made them much more ordinary weapons.

Still, many late World War II Japanese designs were fast, rugged, and agile, albeit again, the very cause for which they began their aggression--lack of raw materials, including oil--meant that metallurgy flaw and especially shortages of fuel and additives restricted the deployment of many machines which were potential world beaters.

The N1K2 (naval fighter), Ki.100, and Ki.100 (army fighters) could never be used in meaningful numbers to defeat the aerial opposition. Channeling aircraft into the Navy's Kamikaze (divine wind) or the Army's Taitari (special attack/ramming, meaning suicide) programs, even though some types were never supposed to be used, drained off human and material resources that could have been meaningfully used in numerous far better ways.

The suicide machines, burdened with explosives and flown by pilots who never even discussed defensive maneuvers, were frequently destroyed long before even sighting targets.

German Fighters

Sophisticated Race "Cars"

German fighters were mostly very sophisticated, but their two primary piston-engined machines were almost opposites. Subtle, in some ways brutish and difficult to handle on the ground, the Messerschmitt Bf.109 was always small in profile. Many analysts compare them to racing cars.

The Focke-Wulf Fw.190, even the sophisticated "D" long nose versions, were tractable and easy to repair. More than 30,000 Bf.109's of all variants were produced by 1945. Just over 20,000 FW.190's of all versions were produced.
Many of the Focke-Wulf fighter specimens were produced as fighter bombers. They are more often compared to a sturdy family sedan.

THE ROLE OF THE FIGHTER

As the war dragged on, many carefully worked out strategic and tactical presumptions had to be modified. The bomber advocates had always contended that "the bombers will always get through."

Their tremendous firepower would, the theory went, destroy and discourage so many fighters that opposing them would be effectively pointless. They were correct to the extent that a fairly high percentage almost always reached the target, but losses were much greater than anyone on either side anticipated.

It had been presumed that nations would succumb to bombing alone and this proved to be entirely wrong. The findings of The United States Bombing Survey and attendant verifying work by English and even Soviet sources made clear that the golden promises of bombing accuracy were meaningless when "interfered with."

Crew fatigue, weather, bomb sights, fighters, anti-aircraft guns, and other factors created a situation whereivv200 miles per hour and that most of his fellow pilots never even engaged a Japanese fighter. Some had never seen any, save as piles of wreckage dumped near captured strips.

As fun as it might seem now, this "lone eagle fighter" stuff was work and dangerous in ways one can hardly imagine, even if the enemy didn't make an appearance. **WOW**

Jim Thompson is a lifelong student of military arms who has been writing books and articles for more than 30 years.

PLANET NEWS ARCHIVE / GETTY

A Grumman Hellcat is ablaze as it comes in for a landing on a U.S. aircraft carrier. An emergency crew on the flight deck was able to rescue the pilot.

Off the Mark

5 Factors That Impacted Bomber Accuracy

1 *Crew fatigue*

2 *Weather*

3 *Bomb sights*

4 *Other fighters*

5 *Anti-aircraft guns*

Common Armament

6 Quick Facts

EARLY IN THE WAR

1 Two to four rifle-caliber machine guns

2 A few machines featured as many as eight machine guns

3 Rarely, some planes had one or two heavier caliber machine guns or a single cannon, usually around 20mm

END OF THE WAR

1 Rifle-caliber machine guns were almost extinct

2 .50-caliber were the minimum main armament

3 Many aircraft featured four rapid fire 20-mm cannonS.

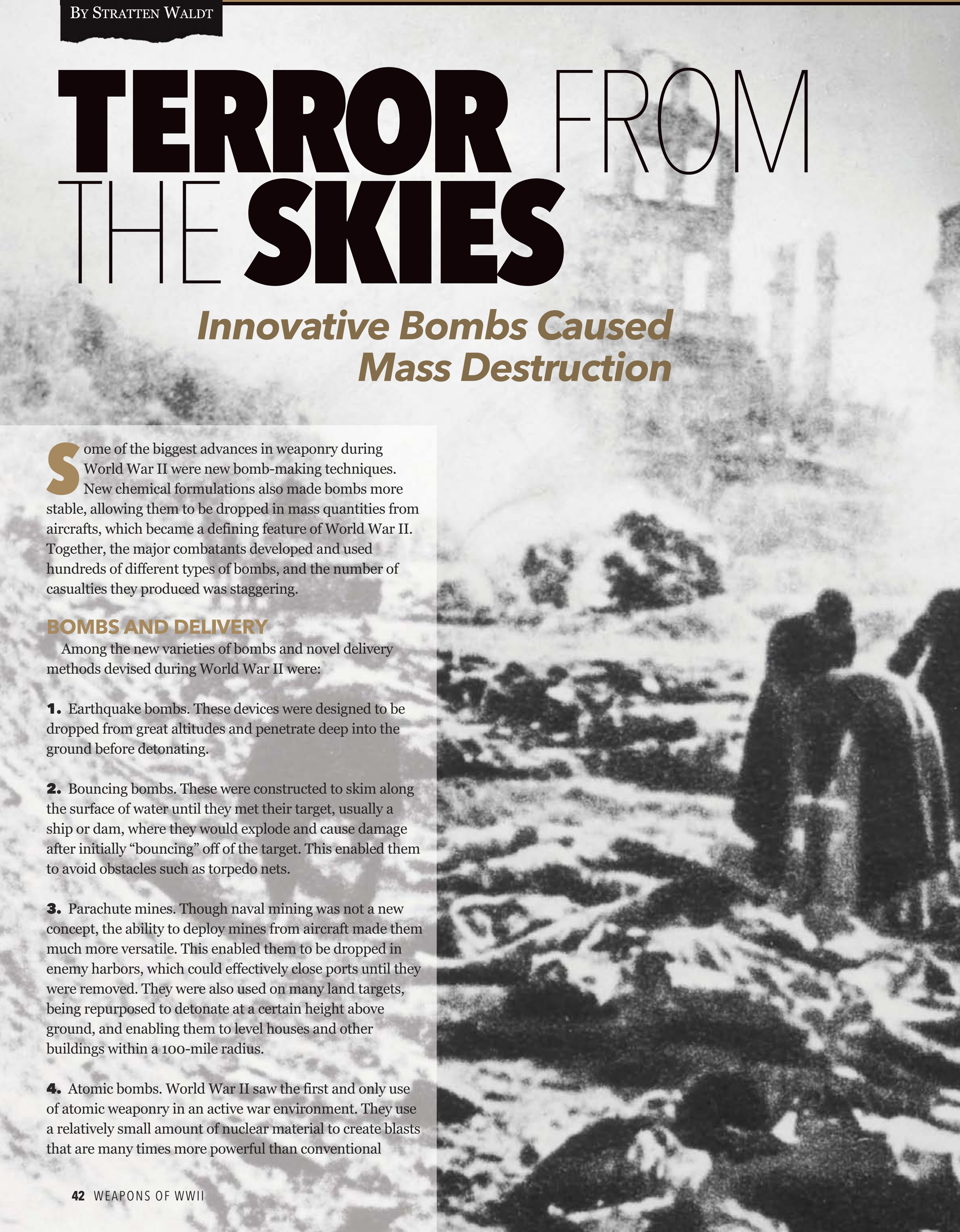
A British Hawker Hurricane fighter lands in the Soviet Union during World War II.

SOVFOTO / UIG VIA GETTY IMAGES

By Stratten Waldt

TERROR FROM THE SKIES

Innovative Bombs Caused Mass Destruction



Some of the biggest advances in weaponry during World War II were new bomb-making techniques. New chemical formulations also made bombs more stable, allowing them to be dropped in mass quantities from aircrafts, which became a defining feature of World War II. Together, the major combatants developed and used hundreds of different types of bombs, and the number of casualties they produced was staggering.

BOMBS AND DELIVERY

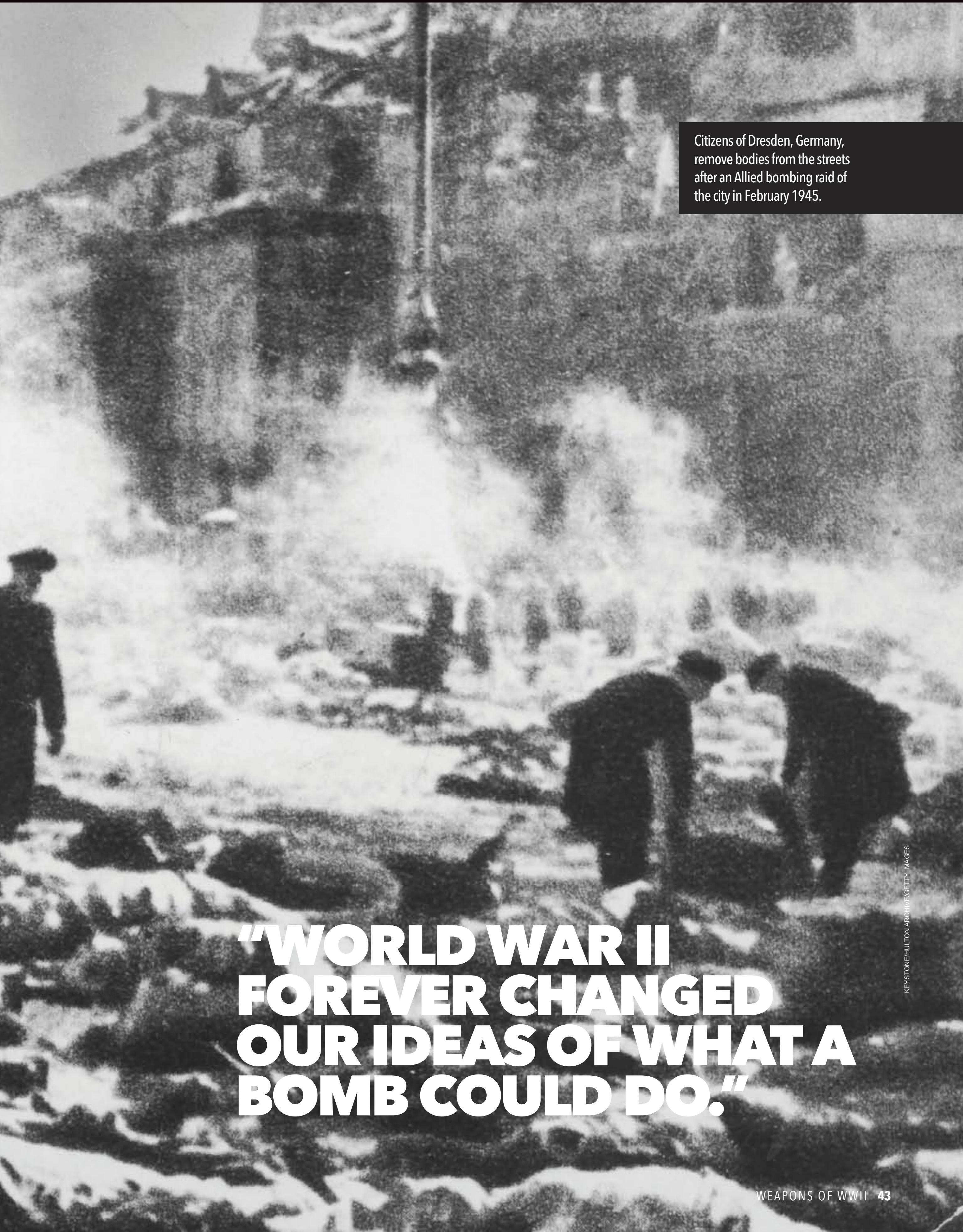
Among the new varieties of bombs and novel delivery methods devised during World War II were:

1. Earthquake bombs. These devices were designed to be dropped from great altitudes and penetrate deep into the ground before detonating.

2. Bouncing bombs. These were constructed to skim along the surface of water until they met their target, usually a ship or dam, where they would explode and cause damage after initially "bouncing" off of the target. This enabled them to avoid obstacles such as torpedo nets.

3. Parachute mines. Though naval mining was not a new concept, the ability to deploy mines from aircraft made them much more versatile. This enabled them to be dropped in enemy harbors, which could effectively close ports until they were removed. They were also used on many land targets, being repurposed to detonate at a certain height above ground, and enabling them to level houses and other buildings within a 100-mile radius.

4. Atomic bombs. World War II saw the first and only use of atomic weaponry in an active war environment. They use a relatively small amount of nuclear material to create blasts that are many times more powerful than conventional



Citizens of Dresden, Germany, remove bodies from the streets after an Allied bombing raid of the city in February 1945.

KEYSTONE/HULTON ARCHIVE/GETTY IMAGES

“WORLD WAR II FOREVER CHANGED OUR IDEAS OF WHAT A BOMB COULD DO.”

TYPES OF HIGH EXPLOSIVES

Bombs during World War II used different materials to create explosions, including:

Amatol
A high explosive material made from the mixture of TNT and ammonium nitrate.

Minol
Developed by the Royal Navy – unsuitable for shells because of detonation at high accelerations, it was used in torpedoes, depth charges and naval mines.

Octol
Used for shaped charges and cluster munitions, it has a much higher detonation velocity than TNT.

Picratol
An HE mixture, its high resistance to shock made it useful in armor piercing munitions and aerial bombs.

Torpex
A secondary explosive favored for its ability to make a longer-lasting explosive pulse, which made it highly valuable in the creation of torpedoes

explosives. The bombings of Hiroshima and Nagasaki are widely credited with ending the war.

There were also significant advances in naval mine technology that made them much more effective. Prior to World War II, most naval mines were contact mines, which meant that a ship had to physically strike them in order to detonate.

However, the Germans were able to devise a new magnetic arming mechanism, which enabled them to sense ships at a distance. In 1939, the British were able to dismantle one of the mines and subsequently developed countermeasures involving ships or low-flying aircraft and electromagnets.

Additionally, advances in aircraft allowed for the construction of ever heavier and more damaging bombs. During World War I, the English used the General Purpose series of bombs, which came in standard sizes ranging from 25 to 500 pounds. By contrast, one of the heaviest conventional bombs dropped during World War II was the Grand Slam, an earthquake bomb that weighed in at 22,000 pounds. Over the course of the war, 42 were dropped.

BOMBING STRATEGIES

Numerous developments in bombing strategies also contributed to greater levels of damage on both sides.

Strategic bombing, the deliberate targeting of crucial points of an enemy's war effort, including factories, oil refineries, railroads and infrastructure, caused more than 2 million deaths on both sides over the course of the war. The Allies experienced relatively few civilian deaths due to bombings.

This contrasts strongly with the British bombing of civilian targets. An estimated 300,000 to 600,000 German civilians and workers were killed by Allied strategic bombing.

In Hamburg alone (which was targeted due to its important role in armaments production), the combination of extremely dry conditions and a period of sustained bombing by both Royal Air Force and USAF planes led to an estimated 42,000 civilian deaths in a period of a little more than week.

This was roughly equal to the civilian casualties of the entire Blitz. The bombings had become unnecessary by 1943 but were continued until nearly the end of the war. This led to accusations that civilians were intentionally being targeted and was often called "terror bombing," though it was not unprovoked.

Incendiary bombing was also used extensively by both sides. They were often used in combination with high explosive bombs, setting fire to the interiors of buildings that were exposed by the first salvo. They were designed primarily to be effective against war industries that were spread out with the intention of escaping destruction by conventional bombs.

Germany initiated the use of incendiary bombs with the offensive on Warsaw, and continued with attacks on Moscow and London. This led to the reprisal bombing by Allied forces, which killed so many civilians. Incendiary bombing was also used frequently by the U.S. on Japan and caused an estimated 100,000 civilian deaths in Tokyo alone. As many as 500,000 Japanese were killed by incendiary bombs over the course of the war.

Later, white phosphorus was introduced as a main component in many incendiary bombs, and proved to be highly effective as an anti-personnel weapon. It was highly valued by U.S. troops for its role in breaking up German infantry attacks.

The World War II forever changed our ideas of what a bomb could do. They caused untold destruction at ranges never seen before. The atomic bombs alone caused more damage with a smaller payload than any weapon seen before or since.

However, they account for a relatively small number of casualties compared to conventional bombs. Unfortunately, it can be very difficult to hit intended targets with bombs deployed from aircraft, and a large majority of casualties produced were civilians.

Airborne bombs are one of the many weapons that came into their own during World War II that changed the face of war forever. **WOW**

Stratten Waldt is a freelance writer and army officer from Durham, North Carolina. He joined the Corps of Engineers after completing ROTC in 2013.

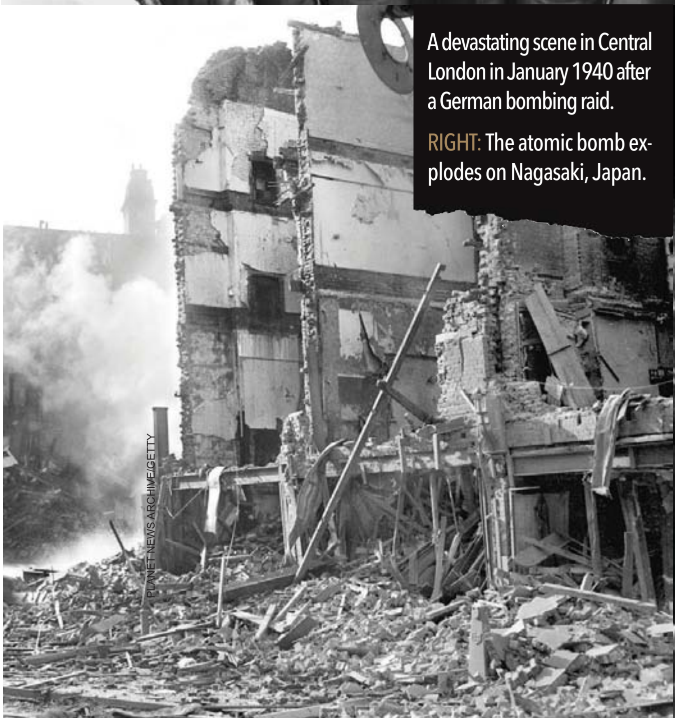
THE BLITZ

One of the most famous examples of strategic bombing was "The Blitz", a period of major German air raids between Sept. 7, 1940, and May 21, 1941.

The Blitz came about as a result of rapid escalation starting on August 25, when Winston Churchill ordered the bombing of Berlin in response to German aircraft accidentally attacking civilian targets the previous night. The German Luftwaffe targeted 16 British cities, most prominently London, in hundreds of raids over a period of almost 37 weeks. Remarkably, only 40,000 British civilians were killed during the raids.

IWM/GETTY IMAGES

Bombs ready in the bay of this British Avro Lancaster bomber before a mission over Germany in 1944.


PLANET NEWS ARCHIVE/GETTY

A devastating scene in Central London in January 1940 after a German bombing raid.

RIGHT: The atomic bomb explodes on Nagasaki, Japan.

PHOTO 12/UIG/GETTY

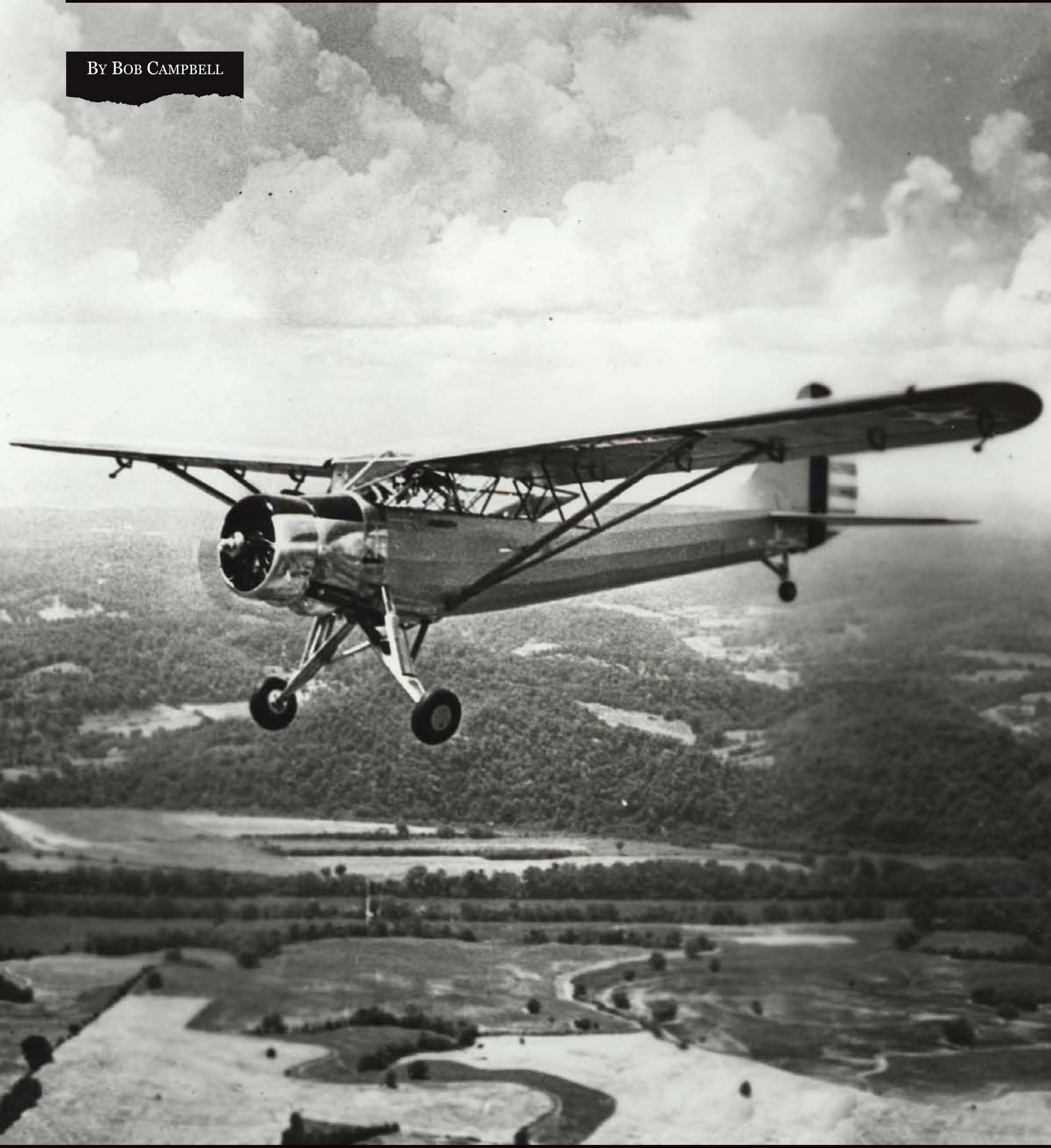
Atomic Bomb Numbers

129,000
The number of deaths attributed to the atomic bombs

2,000
In feet, the altitude at which the bomb over Hiroshima was detonated

10,000
In pounds, the weight of each of the atomic bombs that the U.S. dropped on Japan

By Bob Campbell



The Vultee/Stinson O-49 gives the impression of a sturdy workhorse.

U.S. AIR FORCE PHOTO

IN THE THICK OF BATTLE

Observation and Liaison Aircraft Played A Critical Role

Not all the important aircraft in World War II were fighters or bombers. There was a critical need for light, maneuverable aircraft that could transport documents, perform battlefield observations and make nighttime drops and rescue runs. Many small civilian planes were adapted for these missions, and here are a few of them.

THE PIPER CUB

When World War II began, Piper Aircraft had in production several models that were ideal for liaison and even reconnaissance. The affordable Cub was a popular civilian aircraft.

During the war, the Cub evolved into new models to complement the original J-3. Light, easily serviced and capable of landing on short fields, the J-3 Cub and the Piper L-4 were used in great number.

Among the early supporters of the original Piper J-3 Cub for wartime use was General George S. Patton. The L-4 was a J-3 with more overhead windows. The L-4 was used in all theaters of operation. They were even used as air ambulances. The Navy also used about 230 Piper NE-1s, very similar to the L-4, and a number of NE-2 aircraft. For the most part, they were very similar aircraft.

These aircraft were small and slow, most topping out at 100 mph or less compared to the 350 mph common to fighter planes, but they could land in a fraction of the space. Early J-3 variants are sometimes specified at a top speed of 85 mph. Still, this was fast enough for their important job and they were far superior to the observation balloons once used for artillery spotting.

The L-4 featured a fabric-covered frame and wooden spar, metal ribbed wrings, a metal tube main body and shock absorbing landing gear. The aircraft was equipped with a compass, altimeter and two-way radio.

There is some confusion as to the history of the Taylor and Piper Cubs, but in fact they are much the same, as Mr. Piper was an investor in the aircraft company from the beginning and eventually the company became known as Piper Aircraft. The Taylor Cubs also saw extensive service. They could be flown by those with only a sport pilot license, a big help in the war effort.

As a point of interest, the Piper and Taylor Cubs were each operated by the Luftwaffe. The Danes had set up a factory to produce the J-3 and had begun production of aircraft from kits sent from the United States. When the Germans overran Denmark, the Danes torched the plant. However, a few aircraft survived, most already assembled. It seems that 19 to 20 in German hands is a good estimate.

Vigilant

Crew: 1 (up to two observers)

Length: 34 feet

Wingspan: 50 feet, 11 inches

Height: 10 feet, 2 inches

Empty weight: 2,760 pounds

Maximum take-off weight: 3,400 pounds

Engine: Lycoming Radial, 295 horsepower

Speed: 122 mph

Range: 280 miles

RIGHT: A rare variant of the Vigilant, fitted with skis.

TOP RIGHT: The J-3 has rather useful controls considering its limited but important mission.

THE L-14 AIR AMBULANCE

Among the most important of the Piper variants was the L-14 air ambulance, with a greenhouse extending toward the tail section. This aircraft could carry two litters, one atop the other in bunk style, to transport wounded.

Before the age of helicopters these were important aircraft. The Piper aircraft used during the war were highly developed aircraft with electric starters, advanced flaps and good flying characteristics.

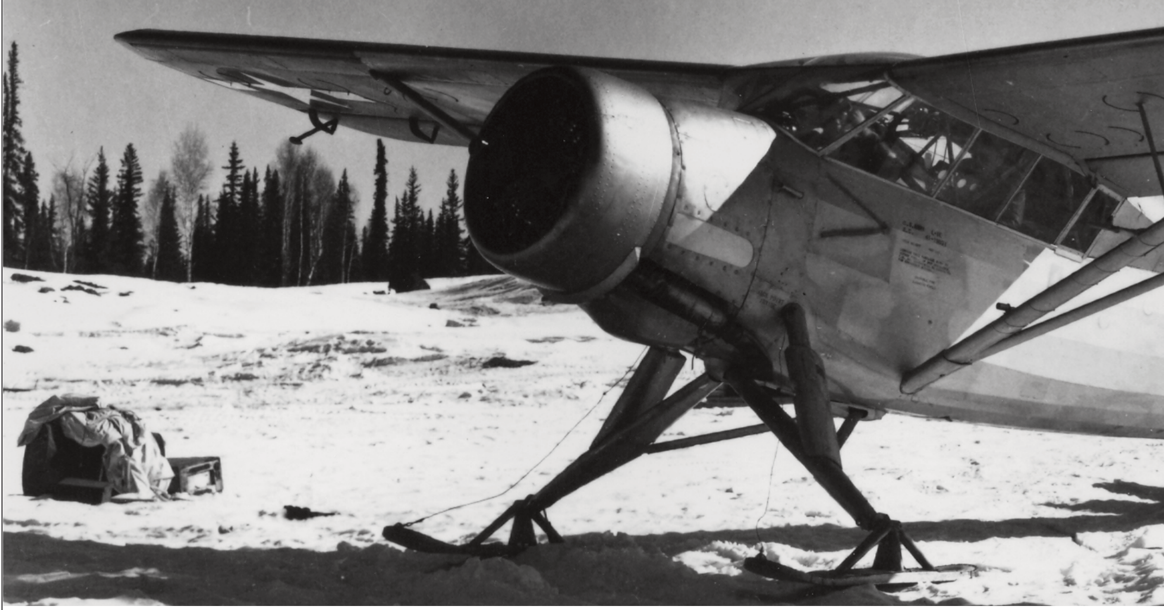
The L-14 ambulance featured a 75-inch track and a long strut for stability. These aircraft were called the generalized term Grasshopper, largely due to their ability to land in small fields.

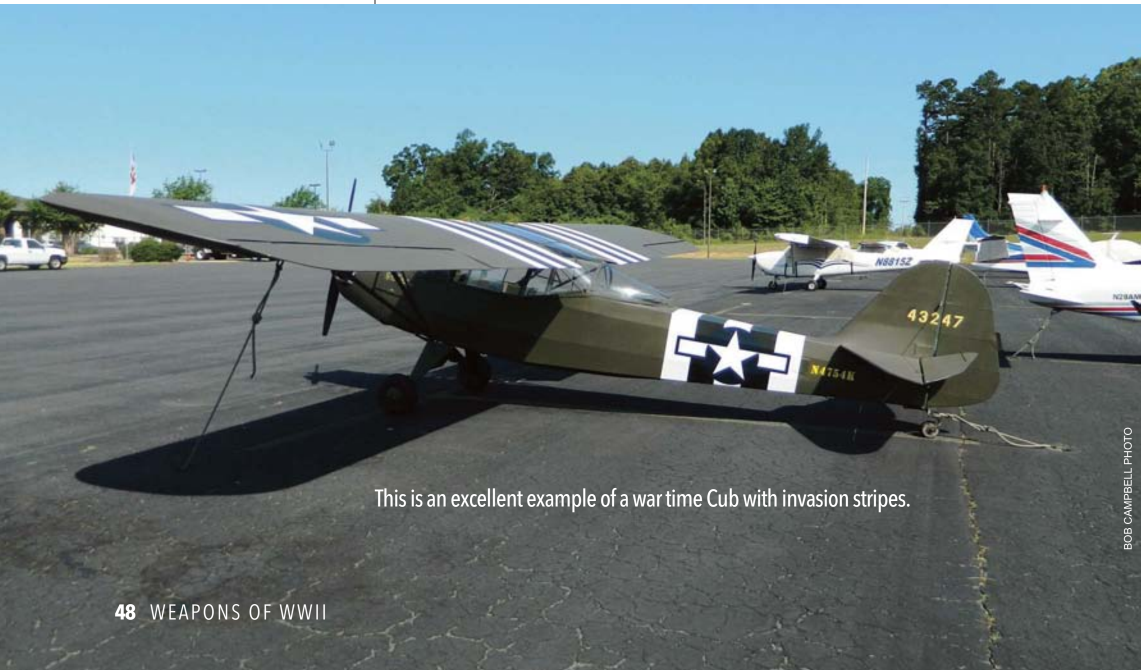
Guadalcanal was the first major American Pacific campaign in World War II in the Pacific and the first time 1st Marine Division conducted combat operations as a division. The 1st Marine Division had an air force of its own consisting of Piper L-4 Cubs and Stinson L-5s provided by the Army. The Division's actions during this operation won it the first of three Presidential Unit Citations during the war. The battles of Peleliu and Okinawa culminated in additional citations. Three weeks after Japan surrendered, the Division was dispatched to North China for occupation duty.

THE WESTLAND LYSANDER

The Westland Lysander was an important aircraft, filling a role the British called Army Cooperation. The Lysander was what we would call today a STOL or short take off and landing aircraft. The Lysander was sent to France in May, 1940 and by June and Dunkirk, 118 were lost.

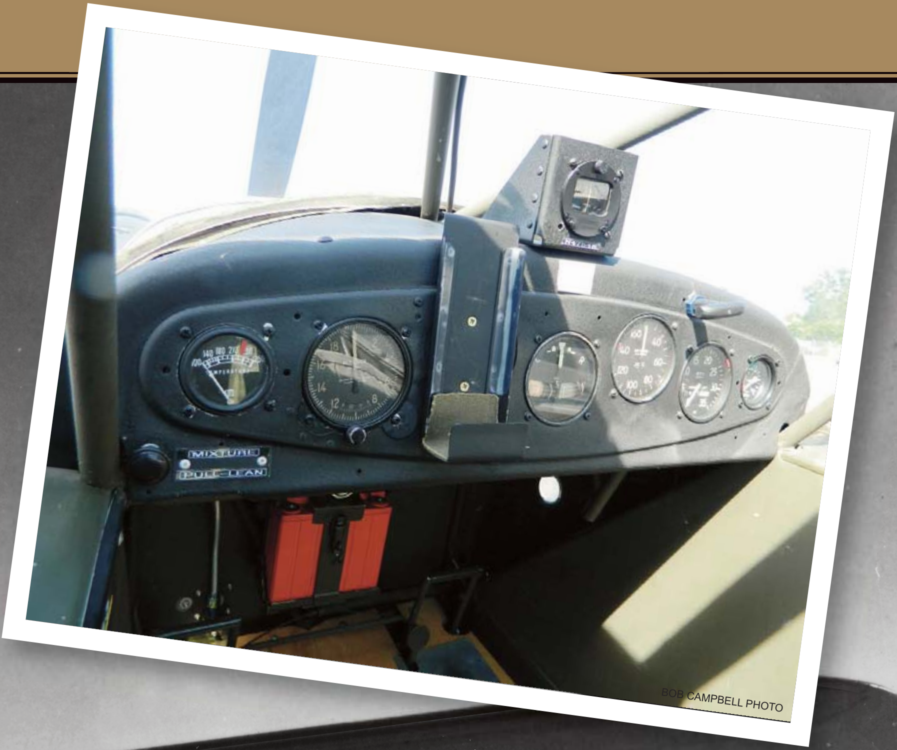
The aircraft could not survive in its original role, but it excelled in night operations to drop





This is an excellent example of a war time Cub with invasion stripes.

BOB CAMPBELL PHOTO



BOB CAMPBELL PHOTO

J-3 Cub

Crew : 1

Length: 22 feet, 4 inches

Wingspan: 35 feet, 3 inches

Height: 6 feet, 8 inches

Weight empty: 765 pounds

Maximum take-off weight: 1,300 pounds

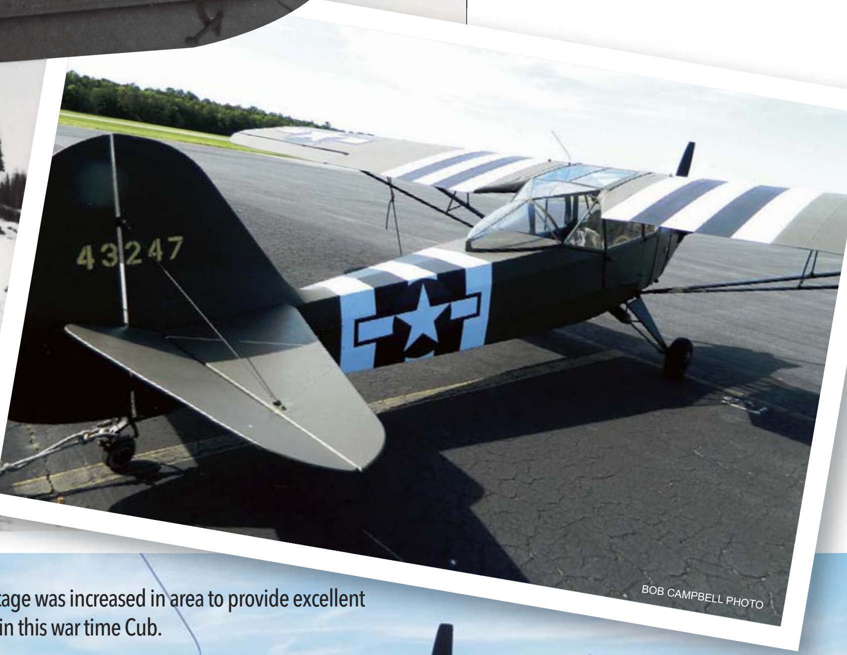
Engine: Continental 4 cylinder, 65 horsepower

Speed: 87 mph

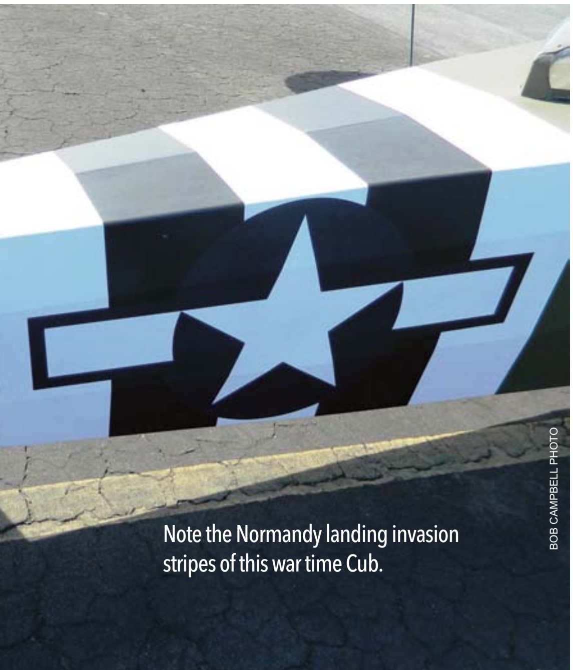
Range: 220 miles

BELOW: Note the enlarged birdcage of this Taylor Cub.

U.S. AIR FORCE PHOTO

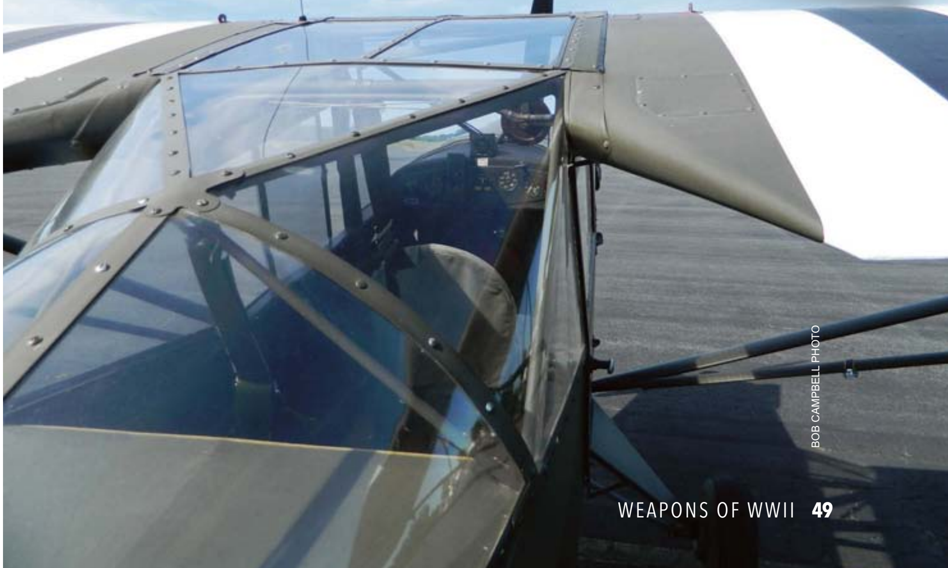


BOB CAMPBELL PHOTO



Note the Normandy landing invasion stripes of this war time Cub.

BOB CAMPBELL PHOTO



The birdcage was increased in area to provide excellent visibility in this war time Cub.

BOB CAMPBELL PHOTO

Westland Lysander

Crew: 1

Length: 30 feet

Wingspan: 50 feet

Height: 14 feet, 6 inches

Empty weight: 4,365 pounds

Maximum take-off weight: 6,330 pounds

Engine: Bristol Mercury, 870 horsepower

Speed: 212 mph

Range: 600 miles

BELOW AND INSET: This is an early Cub, in contrast to the J-3. There is quite a difference in the design of the original Cub fuselage.

BOB CAMPBELL PHOTO

BOB CAMPBELL PHOTO

agents into occupied territory or sometimes landing to pick up important escapees or to rescue air crews that had been shot down over "Fortress Europe."

Lysanders were also built in Canada and many saw overseas service. Interestingly, at one point the only military aircraft in Canada were Lysanders, until the United States was able to send P-40s to the RCAF.

The Lysander's cockpit was modified to accommodate two passengers. They landed on fields in Europe that were lit by five torches as a landing light array. The Lysander was much larger and heavier than the Cub, but it also was faster with a top speed of more than 200 mph.

The Lysander was also designed from the beginning to be an armed close-range support craft, with two forward firing .303 machine guns and the option to twin .303 guns in the rear section. Four 20-pound bombs could also be carried.

The Lysander, however, remained very vulnerable to enemy aircraft and was used in much the same manner as the Cub for its service life. The additional payload proved useful in dropping more than 100 agents successfully into occupied Europe.

THE VIGILANT

Among the most interesting and useful aircraft of World War II was the Stinson L-1 Vigilant and variants, including the Vultee O-49. Designed as a light observation craft, the Vigilant proved useful in many roles during World War II. Stinson became a branch of Vultee during the development process.

The Vigilant won the contract over several competitors. The Vigilant featured a characteristic radial engine. The high wing monoplane featured advanced trailing edge lift devices that gave the aircraft excellent short take off and landing performance. The aircraft featured leading edge automatic slots developed for fighter aircraft. These helped in low speed maneuverability.

Like many aircraft of the day, the O-49 was a combination of steel tube and fabric. The control surfaces were fabric covered stainless steel. The Lycoming engine was hand cranked for starting, which was a disadvantage compared to other types. The aircraft was considered powerful enough to be useful with pontoons for water use. A dozen aircraft were delivered with these pontoons.

According to period reports that remained

In Numbers

Tale of Two Planes

Fastest vs. Slowest

212 MPH

Westland Lysander

87 MPH

J-3 Cub

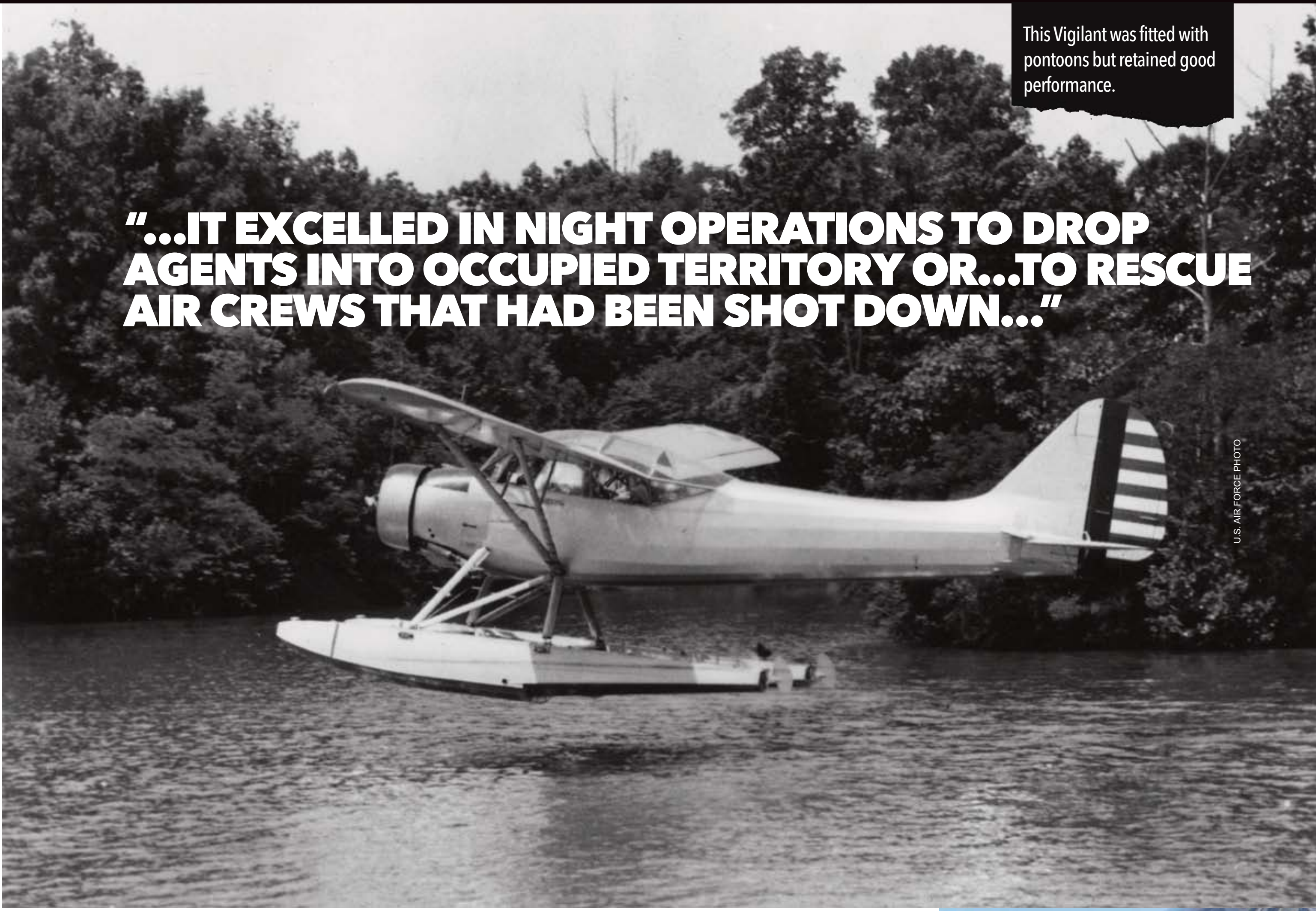
Range Comparison

600 MILES

Westland Lysander

220 MILES

J-3 Cub

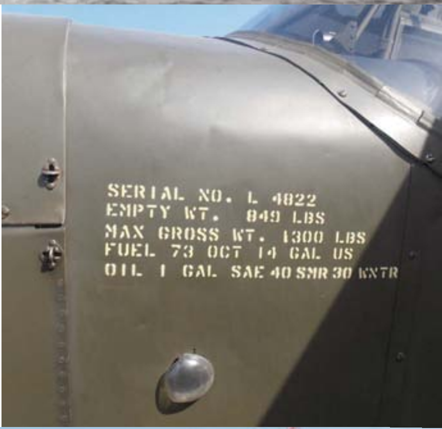


This Vigilant was fitted with pontoons but retained good performance.

U.S. AIR FORCE PHOTO

> **“…IT EXCELLED IN NIGHT OPERATIONS TO DROP AGENTS INTO OCCUPIED TERRITORY OR…TO RESCUE AIR CREWS THAT HAD BEEN SHOT DOWN…”**

RIGHT: Note Continental 4-cylinder engine–a reliable 65 hp design. FAR RIGHT: With a take-off weight of 1,300 pounds maximum, the Cub was a real grasshopper. BOTTOM: Note the invasion stripes of this Cub. It is in olive drab as well.



BOB CAMPBELL PHOTOS

BOB CAMPBELL PHOTO

classified for years, the Vigilant was capable of extraordinary performance. As an example, the aircraft by wartime reports could maintain flight without stalling at 31 mph. The Vigilant was used in many roles, including artillery spotting and towing training gliders. Emergency supply drops were part of the Vigilant’s mission, and also dropping OSS officers behind enemy lines.

In 1942, a redesigned O-49 was given the L-1 and L-1A designation. More than one hundred were supplied to Great Britain, and others to Canada. The Vigilant was superseded by the Sentinel, a light aircraft similar to the Cessna J-3, but manufactured by Vultee/Stinson. **WOW**

Bob Campbell is an outdoor writer specializing in firearms and self-defense.

By Jim Thompson

A U.S. soldier mans a Browning .30-caliber light machine gun in France in 1944.

12/UG/GETTY

FURIOUS FIREPOWER

The Top Machine Guns of World War II

World War I was the first massive “proof” of the machine gun in combat.

As the combatants analyzed the casualty data, they realized that while artillery had caused more overall death and injury, most of it happened because the support machine guns of the period had pinned down masses of infantry, allowing the pulverizing guns of the period to fine-tune aim and adjustments.

The light machine gun had been introduced.

Until well into World War I, the very concept of the machine gun was itself controversial, especially its incorporation with small infantry units. The military bureaucrats surmised ammunition consumption would go way up, and no “real soldier” was afraid of the spraying bullets. Part 1 proved correct; Part 2 not so much.

The second huge conflict would refine all of these with an eye toward greater movement and relative concealability in the field.

Following are the top machine guns of World War II.

BELOW: British soldiers line up during a training course in World War II on the Vickers machine gun.

RIGHT: U.S. soldiers man a Browning .30-caliber M1917A1 water-cooled machine gun in 1945.

GETTY IMAGES

GETTY IMAGES

Late in the war, members of Hitler's youth organization, such as these manning the machine gun, were conscripted to help defend the City of Berlin.

ULLSTEIN BILD / GETTY

THE "HEAVY" GUNS

GERMAN MG42

It was the German Army that changed the game when it came to machine guns. For the most part, they didn't use heavy machine guns during World War II, save for the odd captured and re-dedicated piece or the odd defensive Maxim at some obscure post.

They invented the general purpose machine gun with the MG34, first blooded in Spain in 1935, and then moved on to the MG42, which under various nomenclature forms serves about 16 armies seventy years later and which has been produced in several countries within the last decade.

Those Pakistani guns you see on the news that look like "the old German gun" are called MG42/59s. They are a very slightly upgraded, modernized MG42, still in use 70-plus years after World War II.

VICKERS

The venerable Vickers Gun, including many old Model 1912 guns, served the United Kingdom and Commonwealth throughout the war and, indeed, well into the 1960s.

HOTCHKISS

Hotchkiss guns saw duty, too, both in continental France, and in spun-off versions used in great depth by the Japanese.

Many of the Japanese guns were unique, using the Hotchkiss feed strips and heavy finned barrel but contriving bolt and feed permutations unique to their requirements. Thinking it would obviate feed problems, the Japanese put an oiler on their guns, including the Type 92, but their ammunition failure rate, due to bad chambering concepts and ammunition quality, went up instead of down.

MODEL 1917

The United States had developed the Model 1917 water-cooled gun just before the end of World War I, and some imagine it was actually used in the last few days of that war. It was much improved and strengthened, and early on the Model 1917A1 was the standard company level support gun in 1941.

However, spinoffs from the commercial 1917 and an M2 aircraft .30 caliber guns led to the M1919A4 support gun, air-cooled but generally the same breech. Both served until the very end of the war and beyond, and generally, more guns were continually introduced and at lower levels.

U.S. BROWNING M2

The first .50 Caliber U.S. gun was the Model 1921 and its developments, basically an enlarged version of the M1917A1. But this long, deep receiver required extraordinary cocking and maintenance effort and by the mid-30s, the M2 series of receivers had been developed to compact the system and make it more versatile.

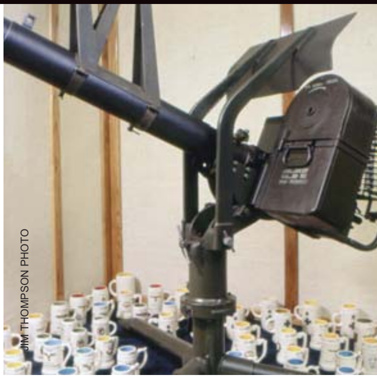
Aircraft and vehicular receivers with reversible feed groups, set up for ammunition chutes and heavy, light and anti-aircraft guns were developed. By the end of the war, the M3 series, superbly polished and brilliantly sprung and engineered, had entered aviation use. Some craft infantrymen found ways to adopt the innards of those to ground guns for reasons of their own.

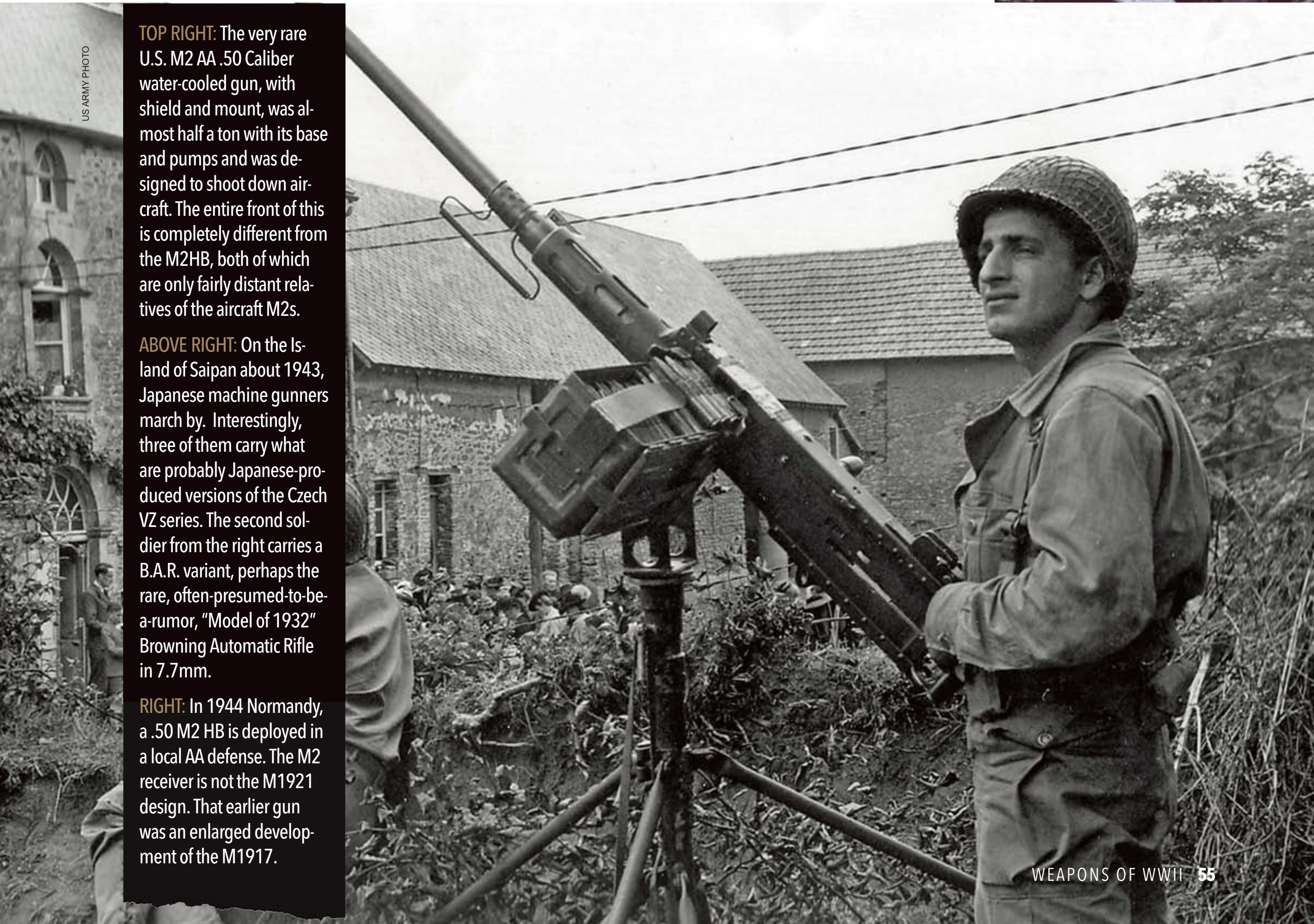
The M2 HB was the infantry version, and eight decades after its inception, it is in service in more places than it was seven decades ago, at the end of World War II.

The .50 M2 Heavy Barrel is not only still in use, but both the U.S. makers and the Belgian F.N. firm have recently marketed upgrade versions to produce an even faster barrel change permutation called the "M2A4 HB." While it may seem strange to see German and former Warsaw Pact armor carrying the venerable signature American "heavy of heavies," it is very common.

SOVIET G43 and DShK

The Soviet Union developed two brilliant gas-operated guns, the Goryunov G43 and the 12.7mm DShK, both of which are still in use. The immense DShK, slightly more powerful than our U.S. M2 .50, is not merely current, but it equips more vehicles now than it did in 1945, now several versions into the series. This gun, because of the 240-plus pound weight of the mounts, does not see much mobile use by infantry, but is still available. However, if you study the news video coming out of North Africa and the Middle East, you'll see the guns used and carried in profusion.

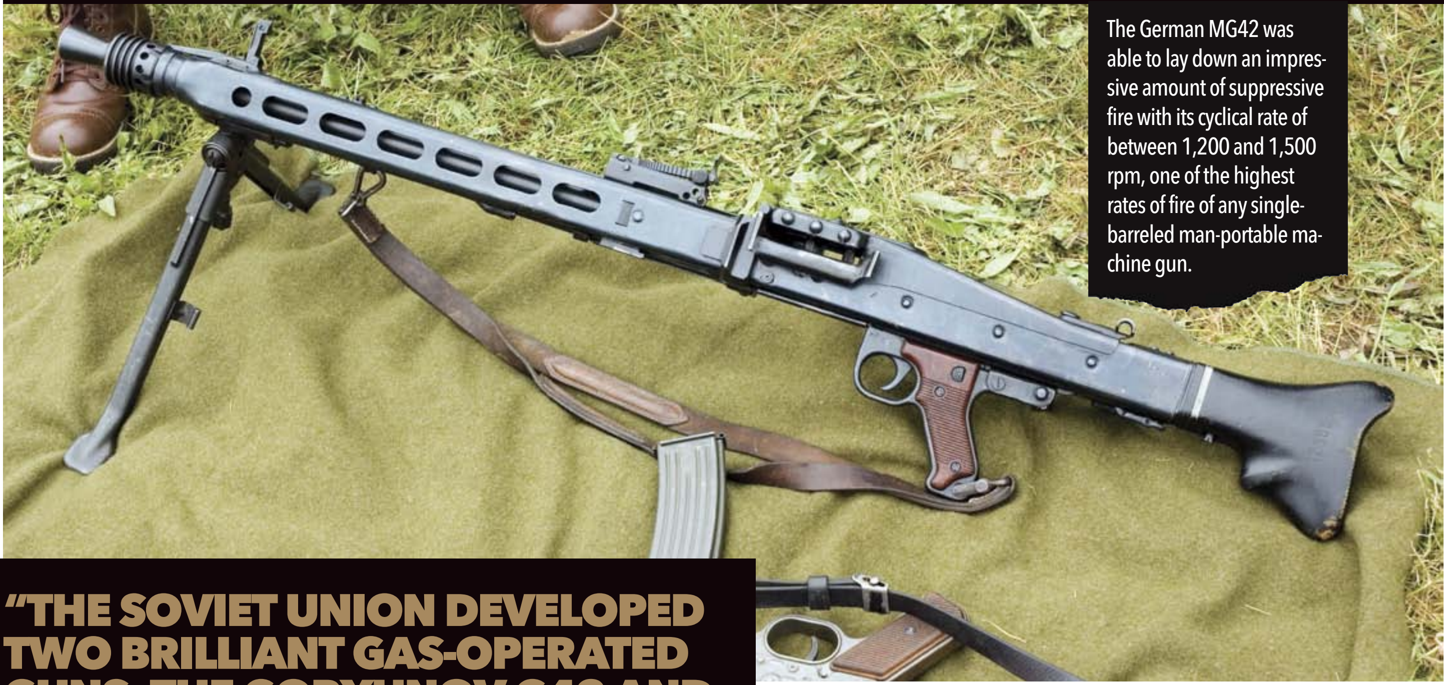

JIM THOMPSON PHOTO


US ARMY PHOTO

TOP RIGHT: The very rare U.S. M2 AA .50 Caliber water-cooled gun, with shield and mount, was almost half a ton with its base and pumps and was designed to shoot down aircraft. The entire front of this is completely different from the M2HB, both of which are only fairly distant relatives of the aircraft M2s.

ABOVE RIGHT: On the Island of Saipan about 1943, Japanese machine gunners march by. Interestingly, three of them carry what are probably Japanese-produced versions of the Czech VZ series. The second soldier from the right carries a B.A.R. variant, perhaps the rare, often-presumed-to-be-a-rumor, "Model of 1932" Browning Automatic Rifle in 7.7mm.

RIGHT: In 1944 Normandy, a .50 M2 HB is deployed in a local AA defense. The M2 receiver is not the M1921 design. That earlier gun was an enlarged development of the M1917.



The German MG42 was able to lay down an impressive amount of suppressive fire with its cyclical rate of between 1,200 and 1,500 rpm, one of the highest rates of fire of any single-barreled man-portable machine gun.

PHANATIC / WIKIMEDIA COMMONS PHOTO

> **"THE SOVIET UNION DEVELOPED TWO BRILLIANT GAS-OPERATED GUNS, THE GORYUNOV G43 AND THE 12.7MM DSHK, BOTH OF WHICH ARE STILL IN USE."**

Quick Facts

1. Heavy guns are generally those intended to always be crew served and positioned on mounts.
2. Light guns can be individually operated, are usually lighter in weight and some provide both magazine and belt feed capability.
3. There is usually an assistant gunner, but his main job is usually carrying ammunition.
4. The general purpose gun is a combination of both.

GERMAN MAXIM

The old water-cooled MG.08 German Maxim, frequently and erroneously called the "Spandau," almost completely disappeared, save from those nations using old surplus German guns. But the Maxim was by no means gone. The Soviet Union used the Model 1910, and China disposed many thousands based upon early commercial variants, most of those the Type 24. Finland used Russian versions and their own, as did many other powers.

THE "LIGHT" GUNS

The light machine guns of World War I had almost completely disappeared from infantry service by 1939.

The Lewis, the Light Maxim, the Hotchkiss "Portative" and other Benet-Mercie derivatives, and the Chauchat were obsolete by 1939. The Lewis, alone, appeared on aircraft and boats well into World War II.

The Browning Automatic Rifle, both in its U.S. and Belgian and other export versions, saw lots of use and was sometimes called a light machine gun. But it really wasn't, lacking both belt feed capability and a quick-change barrel. Still, some called the 15 to 22 pound guns by that appellation and a few spinoffs, mainly the French (MAS) FM 24/29, surely came very, very close.

CZECH VZ26/30

The Czech VZ26/30 series, developed at BRNO by Zbrojavka BRNO, was used by almost every European power, including the Germans, in some numbers, but its real claim to fame was being the core design employed in the famous and still viable BREN gun of British fame.

The original Czech guns were standard LMGs in Romania and a few other lesser powers, but they were good enough that whoever captured them used them.

U.S. JOHNSON AND M1919A6

The brilliant Johnson Light Machine Gun, just 12.5 pounds empty, used a 20-round left side feeding magazine and was recoil operated. Many imagine its commercial prototypes were the inspiration for the brilliant German FG42.

The gun was not as accurate as its peers and it tended not to perform well under very heavy support conditions (longs bursts, and lots of them), but the Rangers and Raiders who deployed the guns liked them. They generally said they'd have preferred longer magazines or belt feed and perhaps a heavier barrel, but it didn't matter.

We had not just B.A.R.'s, but the M1919A6, the rare "light" machine gun spun directly off a support gun that was bulkier and heavier than the tripod-mounted version. I was started when my late uncle Perry explained to the other veterans at a family reunion long ago that his 101st Airborne Division jumped with these, rarely deploying the B.A.R. until the Arnhem operation in September of 1944.

TOP RIGHT: A Browning Model of 1917A1 is used for support and suppression in the Hurtgen Forest in January of 1945.

MIDDLE RIGHT: A German Waffen SS soldier involved in heavy fighting in and around the French town of Caen in mid-1944. He is carrying an MG42 configured as a light support weapon with a folding bipod and detachable drum belt container.

BOTTOM: Red Army soldiers battle for control of a village in the northern Caucasus in 1942.

WILFRIED WOSCIDLO

SOV FOTO/GETTY

JAPANESE TYPE 99

The Japanese, of all the major combatants, had probably the worst of the light machine guns, the Taisho 11 hopper feed, and the very best, the Type 99, a very innovative development of the Czech guns with foreshortened bolt throw and rather high controllable cyclic rate.

At about 23 pounds, 1 kilo heavier than its almost identical Model 96 predecessor, it was set up for telescopic optics, mobile and able to hold up better to long bursts than many of its contemporaries. It was also a very rigid mechanism, gas operated and capable of excellent accuracy.

The Type 99 was chambered in the 7.7x58 mm service cartridge and fired at about 850 rpm, very fast for a light gun. It was ironic because the Type 92 heavy support gun developed less than half that rate. This fit Japanese tactics, which optimized the heavier gun, keeping enemy pinned down while the riflemen and light gunners maneuvered. **WOW**

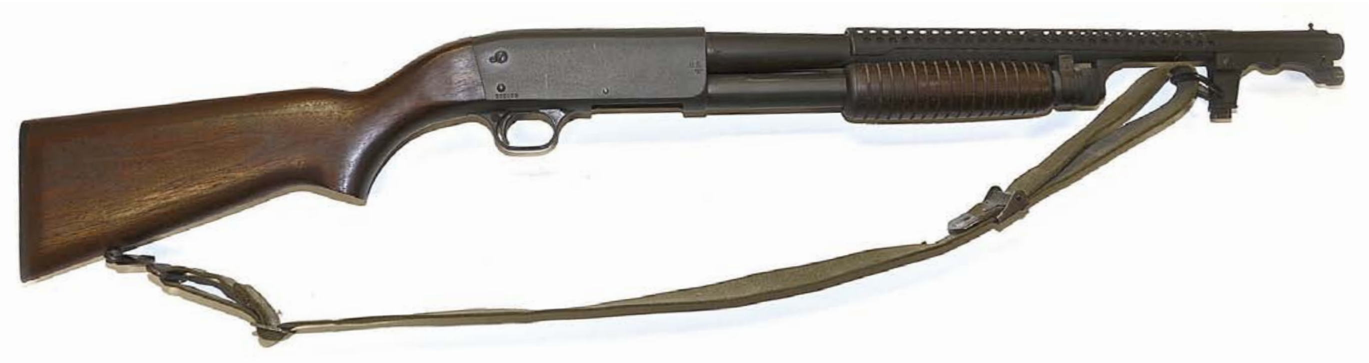
Jim Thompson is a lifelong student of military arms who has been writing books and articles for more than 30 years.

By Leroy Thompson

The U.S. Rushed to Add More Shotguns to its Arsenal in World War II

TK

SCATTERGUN SCRAMBLE



One of the most sought after U.S. military shotguns is this World War II Ithaca Model 37 Trench Gun; only 1,422 were produced.

NARA; JEFF MOELLER & MIKE SPRADLIN PHOTO

The shotgun has maintained an excellent reputation during its long use by law enforcement and as a defensive arm for civilians. But the pump shotgun in particular has played role in military operations over the years as well.

EARLY USE

Before World War I, the military shotgun had performed extremely well for U.S. troops against fanatical Moro tribesmen in the Philippines. As a result, Gen. Pershing, who had seen the shotguns in action during the Philippine Insurrection, implemented their use for trench combat during World War I.

The result was what was termed the “Trench Gun” or “Trench Shotgun.” These shotguns were standard pump action shotguns with features added to enhance their military applicability. Normally, they had cylinder bore barrels of 20 to 23 inches with sling swivels, bayonet lugs and ventilated hand guards so that the shooter could grip the barrel without burning his hand if the bayonet was required after fast firing the shotgun.

The primary shotgun used was the Winchester Model 97 Trench Model, but Remington Model 10 shotguns were acquired in smaller numbers. The Model 97 had a 20-inch barrel and the Model 10 a 23-inch barrel. Unlike the Model 97’s ventilated hand guard, the Model 10 had a wooden hand guard. At least some short-barreled Models 97 and Model 10 “riot guns” without the bayonet lug and hand guard were also acquired.

BETWEEN WARS

After World War I, the shotguns remaining in armories were considered sufficient for the needs of the U.S. Army, U.S. Marine Corps and U.S. Navy.

They were primarily used for guarding prisoners at stockades or providing security at military installations. The USMC used them during the 1920s when they were deployed to guard the U.S. Mail from robbers, and Marines also used them during the counterinsurgency “Banana Wars.”

ANOTHER WAR APPROACHES

By 1940, 21,187 shotguns remained in U.S. armories. Through wear and tear, many of these had already been sent to armories to be refurbished.

However, with the possibility of a new war and the expansion of U.S. armed forces, the Ordnance Department surveyed the possible sources of new combat shotguns if needed. Winchester was still producing the Model 97 and also the Model 12, which had been tested for use in World War I. Ithaca’s Model 37, Remington’s Model 31A, and Stevens’ Model 620A were all deemed acceptable for military usage as well.

By summer of 1941, it was apparent that new combat shotguns were going to be needed. Although Winchester was also making U.S. M1 Garand Rifles and M1 Carbines, a contract was issued in November, 1941, for almost 1,500 Model 97 Trench Guns.

Of course, the Japanese attack on Pearl Harbor on Dec. 7, 1941, caused the War Department to issue procurement orders for even more shotguns.

In addition to the M97 Trench and Riot Guns, Winchester was also given orders for Model 12 Trench and Riot Guns. The Model 12 would prove especially popular with the Marines, who continued to use it through Korea and Vietnam.

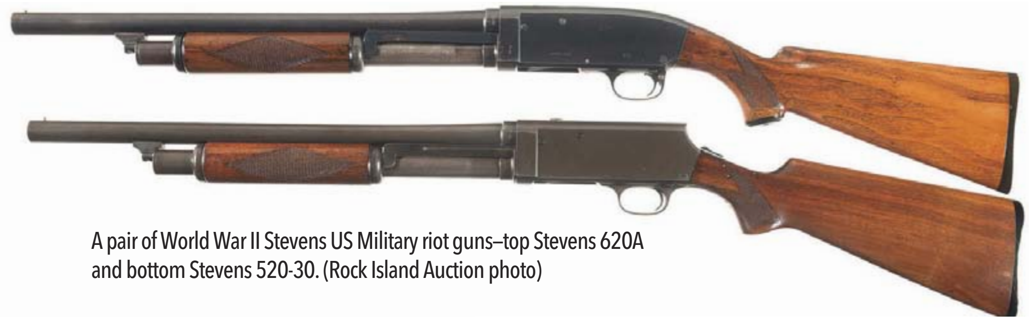
Although Ithaca did supply some shotguns early in the War, including 1,422 M37 trench guns, production of shotguns soon ceased so that Ithaca could concentrate on producing 1911A1 pistols.

Other shotguns delivered during World War II included the Remington Model 31 in Riot Gun format and the self-loading Remington Model 11 and Sportsman. Although there is some evidence that Model 11s were used by U.S. Naval personnel, most of the Model 11 and Sportsman shotguns were reportedly used for guard duty in the United States.

Remington concentrated on producing auto-loading riots guns, as much of the machinery used to produce pump action shotguns was being used to produce M1903A3 rifles. Note, however, that a little less than 9,000 Remington Model 31 shotguns, both riot and longer barreled training guns, were delivered to the armed forces.

Savage/Stevens produced a substantial number of both pump action and auto-loading shotguns during World War II, including Model 520-30 and 620A Trench and Riot Guns, as well as self-loading 720 Riot Guns.

Although it is difficult to give exact production numbers, these companies delivered around 71,500 riot type shotguns and 74,300 trench type shotguns between 1942 and 1944.


A pair of World War II Stevens US Military riot guns–top Stevens 620A and bottom Stevens 520-30. (Rock Island Auction photo)

SHOTGUNS EFFECTIVE IN SOUTH PACIFIC

From the beginning, the USMC was a major client for fighting shotguns, which proved especially effective in the jungle fighting in the South Pacific.

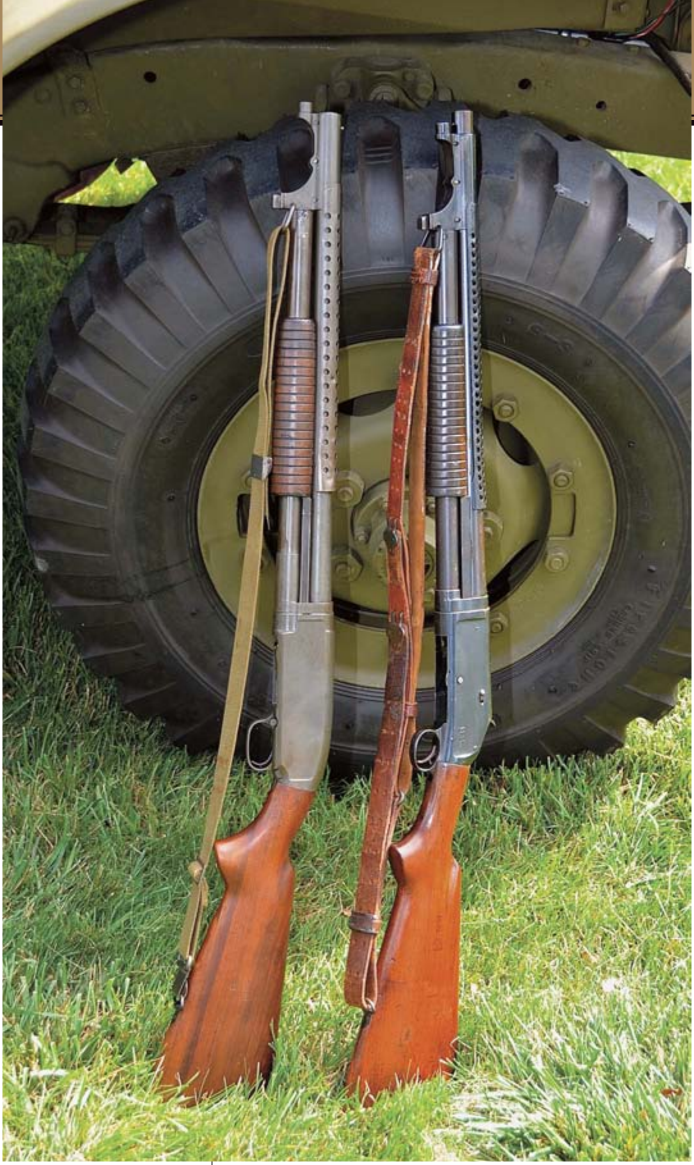
As Bruce Canfield points out in his guide to U.S. Military shotguns, the number of shotguns on the TO&E (Table of Organization and Equipment) for Marine Corps units varied. For example, the 2nd Marine Division had a recommended allowance of 490 shotguns.

The recommended allowance varied to some extent among Marine Divisions; however, when a Marine Division was going into combat little attention was paid to the official TO&E. Marine units often had twice as many shotguns as authorized.

Marine Raiders were reportedly especially fond of the shotgun. The Marines found only one major problem with their shotguns: the difficulty in acquiring enough ammunition for them.

(continued on opposite page)

World War II 1942 Dodge ¾-ton WC51 Truck with a nice example of a M97 Trench gun leaning nearby. Truck drivers were among the users of military shotguns. (Jeff Moeller & Mike Spradlin photo)



At left a Winchester M12 Trench Gun and at right a Winchester M97 Trench Gun leaning against a World War II Dodge Truck. (Jeff Moeller & Mike Spradlin photo)

The Marines almost exclusively used Model 97 and Model 12 Winchester shotguns. To some extent the appeal of these two shotguns to the Marines was their lack of a trigger disconnect, which allowed the shotgun to be fired rapidly by just holding back the trigger and pumping as fast as possible. This tactic was excellent for breaking an ambush, which is one reason that the shotgun has traditionally been favored by point men.

During the fighting in the Pacific, the shotgun also proved itself useful at night to stop Japanese infiltrators; to protect headquarters, machine gun emplacements or other targets of Japanese attack; and in clearing Japanese from caves or bunkers, often in conjunction with the flamethrower.

Reportedly, in preparation for the assault on the Japanese Home Islands, U.S. Marine units scrounged every shotgun and as much shotgun ammunition as they could in anticipation of bitter close combat to come.

BAYONET READY

During World War I, when Winchester Model 97 and Remington Model 10 Trench Guns were produced, their bayonet lug was designed to take the 1917 Enfield bayonet, which was available in substantial quantities.

When Trench Shotguns were produced during World War II, they were also designed to take the M1917 bayonet. New bayonets were not produced as enough were in armories to fill the need.

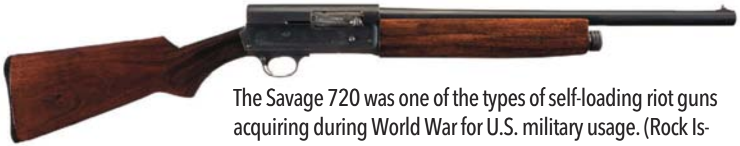
Slings for World War II combat shotguns were the same as those used for some rifles. Originally, the M1907 sling for the M1903 and M1 rifles was used. Later in the war, the M1 sling for the M1 rifle was also used on Trench and Riot Guns.

SHOTGUNS SEE CONTINUED USE

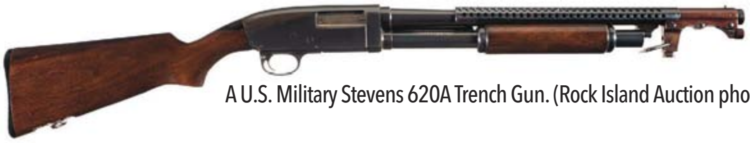
After World War II, shotguns that had remained in good condition, as well as those that had been overhauled, remained in armories. When the U.S. entered the Korean War, the terrain did not lend itself to use of the shotgun, though a substantial number were used to guard machine gun emplacements, depots and headquarters.

When the Vietnam War started, the same shotguns used in Korea were initially used, though combat in the jungles once again made the shotgun a popular weapon. As a result, as the U.S. involvement increased, the shotguns on hand did not prove sufficient, and contracts were let for additional shotguns.

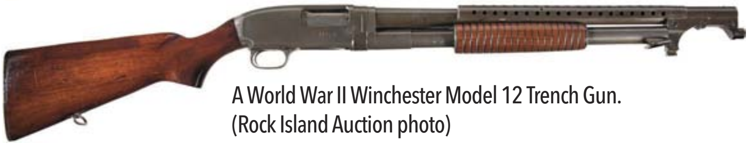
Over the years, most of the World War II shotguns were either retired due to wear, left



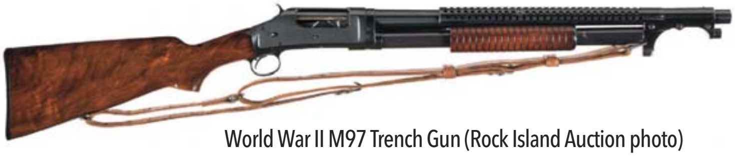
The Savage 720 was one of the types of self-loading riot guns acquiring during World War for U.S. military usage. (Rock Island Auction photo)



A U.S. Military Stevens 620A Trench Gun. (Rock Island Auction photo)



A World War II Winchester Model 12 Trench Gun. (Rock Island Auction photo)



World War II M97 Trench Gun (Rock Island Auction photo)

MILITARY TURNS TO BRASS SHELLS

As in World War I, when the moisture in the trenches caused problems with paper shotgun shells swelling and becoming unreliable, this same problem arose with Marines in the humid Pacific jungles. As a result, the same solution that had been adopted in World War I was adopted–all brass shotgun shells.

Late in 1943, contracts were awarded to Remington and Winchester to produce all brass buckshot rounds. Millions were produced during 1944. By 1945, the brass shells had been designated for overseas use, while remaining stocks of paper cartridges were retained for guard and other duties in the USA. In March, 1945, the brass ammunition was designated: "Shell, Shotgun, All Brass, No. 00 Buck, M19."

Carrying shotgun shells in combat was also somewhat difficult. The most common method of carrying shotgun shells during World War II was in what was known as the "M1938 Shotshell Pouch." These pouches had belt loops and held 12 shotgun shells. These would have been sufficient for MPs armed with shotguns while guarding HQ or prisoners or for sentries assigned at depots.

However, Marines or Army infantrymen in combat would have run through 12 rounds very quickly. Marines, especially, tended to use gas mask bags or World War I grenade vests to carry more shells. Cargo pockets were also often stuffed with shells.

> **"...THEIR LACK OF A TRIGGER DISCONNECT... ALLOWED THE SHOTGUN TO BE FIRED RAPIDLY BY JUST HOLDING BACK THE TRIGGER AND PUMPING AS FAST AS POSSIBLE."**

behind in Vietnam or given to law enforcement agencies. During the years just after World War II some were sold as surplus. By the 1980s most were gone, replaced by the Mossberg 500 and other shotguns.

However, there are reports of some World War II-era shotguns remaining in armories during the First Gulf War and seeing service.

PRIZED BY COLLECTORS

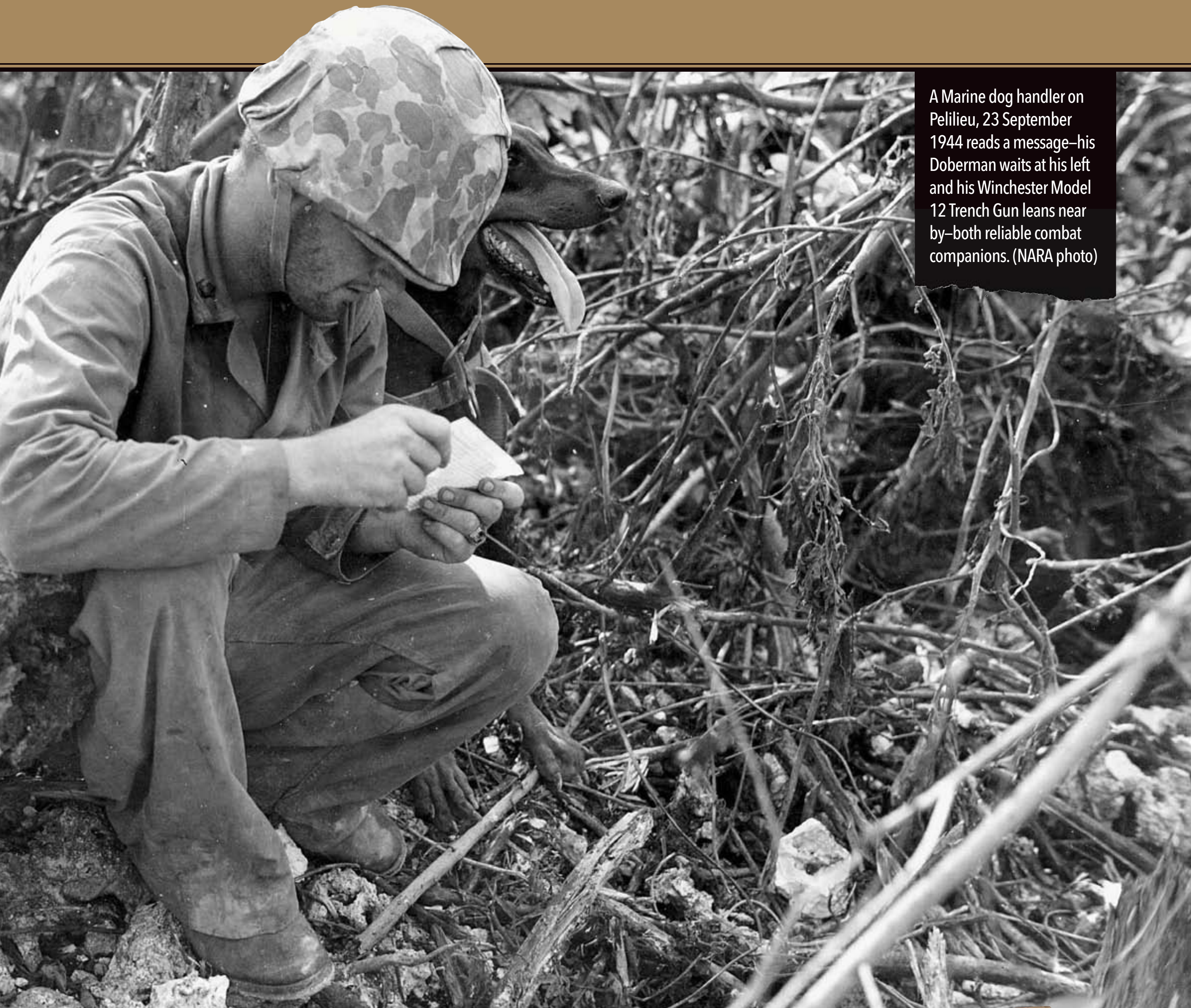
Most World War U.S. fighting shotguns live on today as prized pieces in World War II weapons collections. As is normal with collectible firearms, those in almost new condition are most sought and bring the highest price.

However, there are also some collectors who like the ones showing the marking indicated they were rebuilt after World War II and likely saw service in Korea and Vietnam. I have a Model 12 Trench Gun of this type that is one of my favorites. I'd love to know the story of each dent in the stock or scratch on the finish. **WOW**

Leroy Thompson is a longtime gun writer and an expert in VIP protection, hostage rescue and counterinsurgency.

Loading the Model 97 Trench Gun. (Author photo)

FAR RIGHT: Humid conditions in the South Pacific caused paper shotgun shells to swell and become unreliable, so late in World War II they were replaced with brass shells. (Author photo)



A Marine dog handler on Pelilieu, 23 September 1944 reads a message–his Doberman waits at his left and his Winchester Model 12 Trench Gun leans near by–both reliable combat companions. (NARA photo)

U.S. Marines with their M1928 TSMGs, circa 1940. The Marine Corps was the first U.S. military branch to use the Thompson during the 1920s "Banana Wars" in Central America.

By Chuck Taylor

TOP SMGs

The Six Most Prominent Submachine Guns of World War II

USMC PHOTO

Without a doubt, the submachine gun (SMG) came of age in World War II, with a number of countries even advancing from first to second generation designs.

Yet, though it was an improvement, it wasn't the solution that most war-planners were looking for. Specifically, because of the pistol cartridge it utilized, the SMG lacked range and penetration.

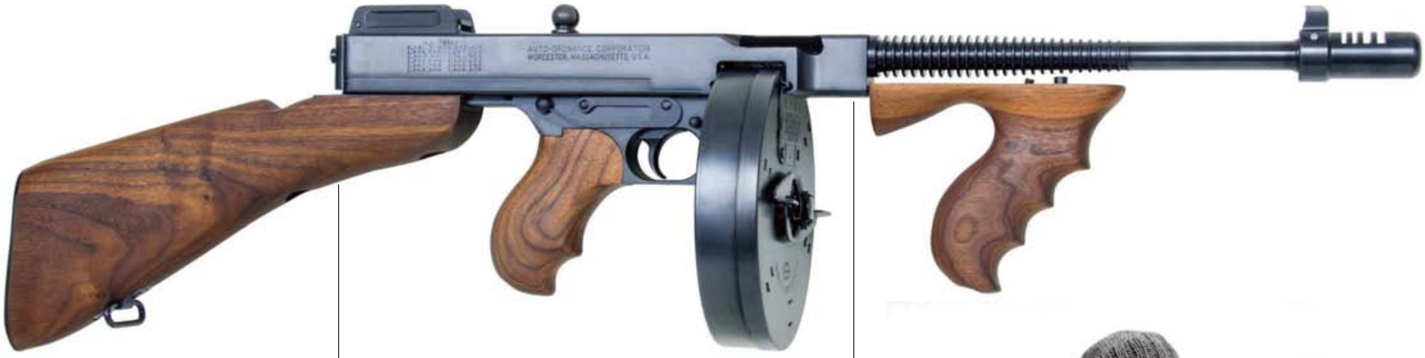
Nonetheless, because airborne and mechanized warfare were emerging as the dominant military doctrines, closer-range combat became more frequent, so the SMG's shortcomings were overshadowed by its fast handling qualifies and high volume of fire. As such, nearly every country involved in the war fielded some kind of SMG, but there were six in particular that were most prominent. They served with distinction, not only during World War II itself, but in the decades that followed, some even into the 1970s.

1) .45 ACP THOMPSON (TSMG)

The most well-known was the U.S. .45 ACP Thompson (TSMG), in its M1928A1, M1 and M1A1 configurations.

The M1928 was first standardized by the U.S. Army in 1936 for motorcycle dispatch riders and cavalry (yes, horse cavalry - it wasn't disbanded until 1942). However, the U.S. Marines had used small quantities of original M1921 Thompsons in the "Banana Wars" of the early 1920s and found them to be excellent weapons for jungle fighting, a conclusion which resurfaced during the Pacific island-hopping campaigns, where Thompsons were much sought-after.

In all, by 1943, 1.75 million M1928A1, M1 and M1A1 TSMGs were produced by not only its parent company, Auto-Ordnance Corporation, but also under contract by Savage Arms.



Key Numbers

1.75 MILLION
By 1943, the number of M1928A1, M1 and M1A1 TSMGs that were produced

6 MILLION
The number of 7.62x25mm Russian PPSh41's produced

2 & 50
The Russian PPS43 was twice as fast to manufacture as the PPSh41 and had 50% less steel

3.7 TO 4.6 MILLION
The estimate on the number of STENs produced

20
In dollars, the cost to produce the M3/M3A1

1.1 MILLION
The number of MP38/40 's produced

Although the Thompson was much revered by those who used it — its stopping power and mechanical reliability were legendary — it was still a first-generation design and was thus heavy, expensive and time-consuming to produce. In fact, when the U.S. military finally standardized the M1928A1 as their general-issue SMG in 1939, they were already looking for ways to make it faster and less expensive to produce. The M1 and finally M1A1 were the result and began appearing in 1940.

Its weight and expense notwithstanding, the TSMG performed magnificently in both the Pacific jungles and urban fighting in Europe and became quite popular. The famed British Commandos adored the M1928 TSMG and even incorporated it into their insignia. The last Thompsons were produced in 1943, but they continued to be found all over the world, wherever there was conflict. It again surfaced in Korea, Vietnam and countless “dirty little wars” all over the world well into the 1980s.

Pros & Cons

.45 ACP Thompson

Pros

- Stopping power
- Mechanical reliability

Cons

- Heavy
- Exensive
- Time consuming to produce

IMPERIAL WAR MUSEUM

The British Commandos also utilized the TSMG in both M1928 and M1/M1A1 versions throughout World War II.

"IT AGAIN SURFACED IN KOREA, VIETNAM AND COUNTLESS 'DIRTY LITTLE WARS' ALL OVER THE WORLD WELL INTO THE 1980S."

2) 7.62X25MM RUSSIAN PPSH41

The 7.62x25mm Russian PPSh41 (Pistolet Pulemyot Shpagin, Model of 1941) was an attempt at simplifying the PPD40 (itself a copy of the Finnish Suomi) and was produced in staggering numbers (over 6 million). It was used not only with Russian forces during World War II, but with nearly all Warsaw Pact satellite nations, as late as the 1970s. Light, compact, inexpensive and highly reliable, it utilized either a 71-round drum or 35-round box magazine and had a crude, but effective muzzle brake that made its report quite sharp.

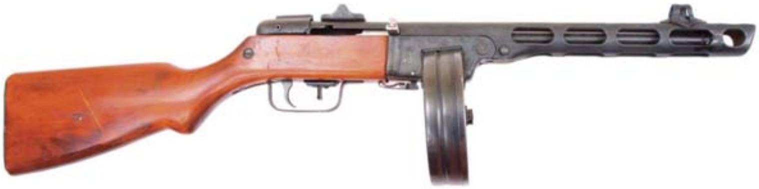
It also ejected straight up, rather than to the side, showering its operator with hot spent cartridge cases, causing some soldiers with a sense of humor to comment that the PPSh41’s ejection system was the reason Soviet troops were eager to advance! On a more somber note, until the proliferation of the AK-47 assault rifle two decades later, it quickly became the symbol of communism's post-WWII agenda to dominate the world.

Interestingly enough, due to its exceptionally high cyclic rate (1,200 rpm), the PPSh41 was also a favorite of Wermacht troops during Germany's ill-fated invasion of the Soviet Union. Faced with constant human-wave attacks, they found the cyclic rate of their own MP38s and MP40s to be too slow to handle the masses of oncoming Russian troops.

Fast Facts

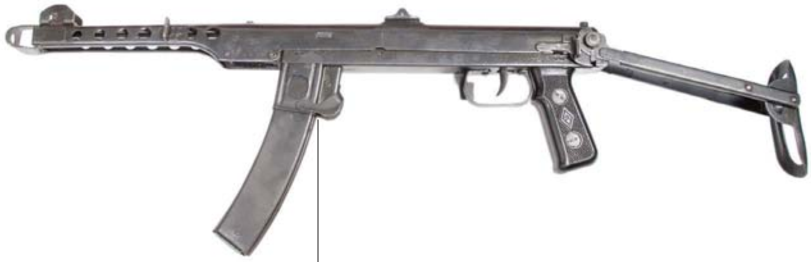
7.62x25mm Russian PPSh41

- Light, compact and reliable
- Featured a 71-round drum



> "IT ALSO EJECTED STRAIGHT UP, RATHER THAN TO THE SIDE, SHOWERING ITS OPERATOR WITH HOT SPENT CARTRIDGE CASES ..."

US ARMY PHOTO



3) RUSSIAN PPS43

The Russian PPS43 (Pistolet Pulemyot Sudaeva, Model of 1943) also utilized the 7.62x25mm Tokarev pistol cartridge and was produced to satisfy the Soviet Army's desire to further reduce SMG production time and expense.

Constructed entirely of stampings, it was twice as fast to manufacture than the PPSh41 and required 50% less steel. It utilized a folding stock, a muzzle brake similar to the one used on the PPSh41 and a 35-round box magazine and was capable of only fully automatic fire. This necessitated a slower cyclic rate of 500-600 rpm to allow operator burst control or single shots by tapping the trigger. Approximately 2 million PPS43s were manufactured, and it continued to be utilized by both Soviet and Warsaw Pact nations well into the 1970s, when it was replaced by the AK-47 assault rifle.

Quick Facts

Russian PPS43

- It featured a folding stock
- The muzzle brake was similar to the one used on the PPSh41
- It had a 35-round box magazine
- It was capable of only fully automatic fire
- The AK-47 replaced it

4) BRITISH 9MM STEN

The British 9mm STEN began production in 1940 and was intended to replace the more expensive Thompson. However, though a true second generation design, its Spartan appearance in comparison to the sleek Thompson quickly gave rise to a number of disparaging nickname. Indeed, not always without malice, British and Commonwealth soldiers often referred to it as the "Stench Gun" or "Lethal Mechanics Lube Tube." The famed Commandos even refused to give up their cherished Thompsons for STENs when ordered to do so.

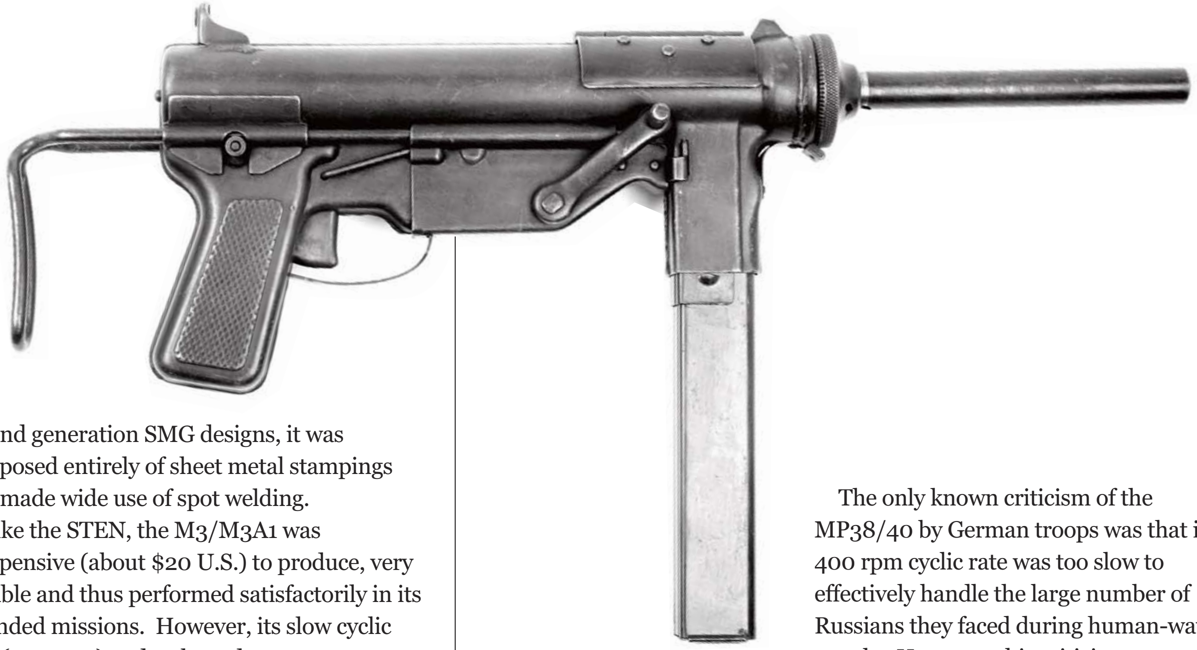
Realistically, the STEN series (Mk 1 through Mk 6), was more reliable than it looked and performed satisfactorily all over the world during World War II and beyond. The number of STENs actually produced vary with the source, but the number hovers between 3.7 to 4.6 million. It was also exceptionally quick to produce and inexpensive (about $10 U.S.), a necessity at the time, because Britain has lost most of its weaponry during the evacuation of their expeditionary force at Dunkirk. Moreover, it could also be provided in quantity to partisan forces behind German lines, a plus factor since both American OSS and British SOE teams were quite active in those areas.

Now You Know

The STEN, intended to replace the Thompson,
had disparaging nicknames, one of which was the "Stench Gun."

5) .45 ACP M3/M3A1

American's first second generation SMG was the .45 ACP M3/M3A1. Like the STEN, its bizarre appearance in comparison to the Thompson, which it was intended to replace, caused it to receive the unofficial but widely prolific and not altogether facetious name of "Grease Gun" or "Greaser." Like all other



DREAMSTIME

second generation SMG designs, it was composed entirely of sheet metal stampings and made wide use of spot welding.

Like the STEN, the M3/M3A1 was inexpensive (about $20 U.S.) to produce, very reliable and thus performed satisfactorily in its intended missions. However, its slow cyclic rate (350 rpm) and awkward appearance prevented it from ever completely replacing the highly-popular Thompson. Still, 700,000 of them were produced and in continued to serve well into the 1970s.

Performance Notes

- Reliable
- Slow cyclic rate

6) 9MM GERMAN MP38/40

The 9mm German MP38/40 was the first second generation SMG to be produced and without question influenced all subsequent SMG designs.

First appearing in 1938, it made extensive use of sheet metal stampings, phenolic resins and was fast and economical to produce. It's appearance in early WWII combat in North Africa caused quite a stir with British and American troops, who incorrectly dubbed it, "The Schmiesser."

Actually, according to official sources, neither Hugo Schmiesser nor his company were involved in the MP38/40 project (Heinrich Vollmer was its designer). Nearly all MP38/40s were manufactured by Erma Werke, who eventually produced 1.1 million of them. The MP38/40 was compact, relatively light, rugged and reliable and served with great distinction. A great many of them were captured by Soviet forces who in turn provided them to the communist Chinese, North Vietnamese and Viet Cong forces during later wars in Korea and Vietnam.

The only known criticism of the MP38/40 by German troops was that its 400 rpm cyclic rate was too slow to effectively handle the large number of Russians they faced during human-wave attacks. However, this criticism must considered to be exceptional, because no such complaint was voiced in any other theater of operations in which German troops operated.

The Strengths

- Compact
- Relatively light
- Rugged and reliable

LASTING LEGACY

These, then, were the top SMGs of World War II. The Thompson, PPSh41, PPS43, STEN, M3/M3A1 and MP38/40 represented the best technologies of the nations that produced them and caused dozens of other nations to scramble to produce similar weapons of their own.

Though the day of the submachine gun is largely over, examples of all of these fine weapons continue to be encountered throughout the world, lending testament to their effectiveness. The assault rifle may have replaced them, but their legacy remains strong and will continue to be seen for generations to come. **WOW**

Chuck Taylor is a decorated Vietnam Veteran, four-weapon Combat Master and an expert in SWAT, counter-insurgency and counter-terrorist operations.

DREAMSTIME

BATTLE

By KM Lee

World War II forced a rapid advancement in weapons of all types, with main battle rifles serving as the most visible and hands-on examples we can examine today.

There's probably no better way to start a heated argument than by selecting a single rifle as the best of the bunch. So we're not going to pick that fight. Instead, we'll just toss fuel on the fire by offering one list of top rifles from the World War II era. You decide which rifle tops your list.

BRITISH LEE-ENFIELD

During the era that "the sun never set on the British Empire," it was the Lee-Enfield rifle that helped make it so. First adopted in 1895 and chambered in .303 British caliber, it served in various iterations up through 1957.

Lee-Enfield No.1 Mk III rifles placed in action during the World War I saw combat again in World War II, along with the No. 4 Mk I, which was officially adopted in 1941 because it required less hand-fitting and was therefore quicker and less expensive to produce.

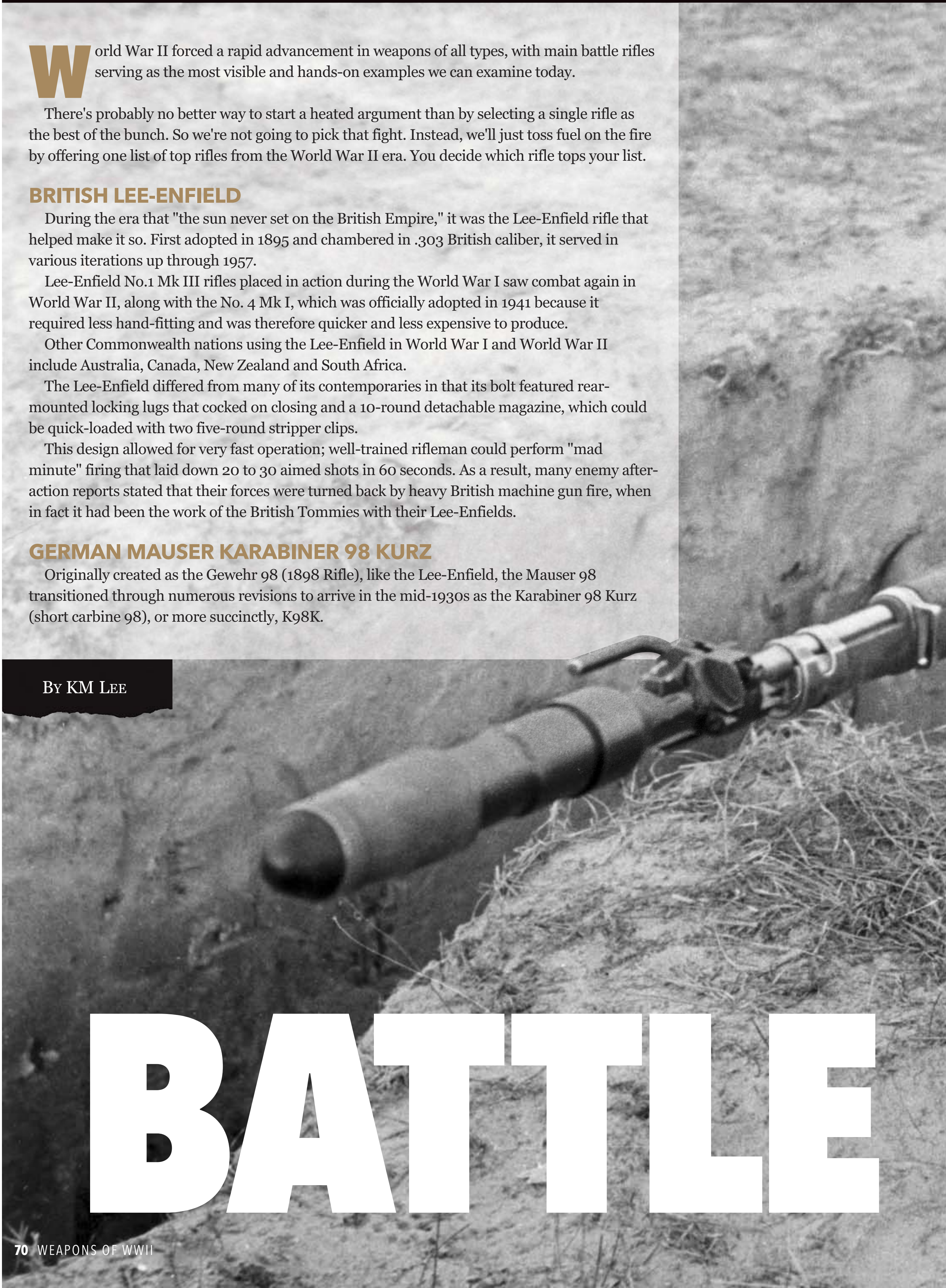
Other Commonwealth nations using the Lee-Enfield in World War I and World War II include Australia, Canada, New Zealand and South Africa.

The Lee-Enfield differed from many of its contemporaries in that its bolt featured rear-mounted locking lugs that cocked on closing and a 10-round detachable magazine, which could be quick-loaded with two five-round stripper clips.

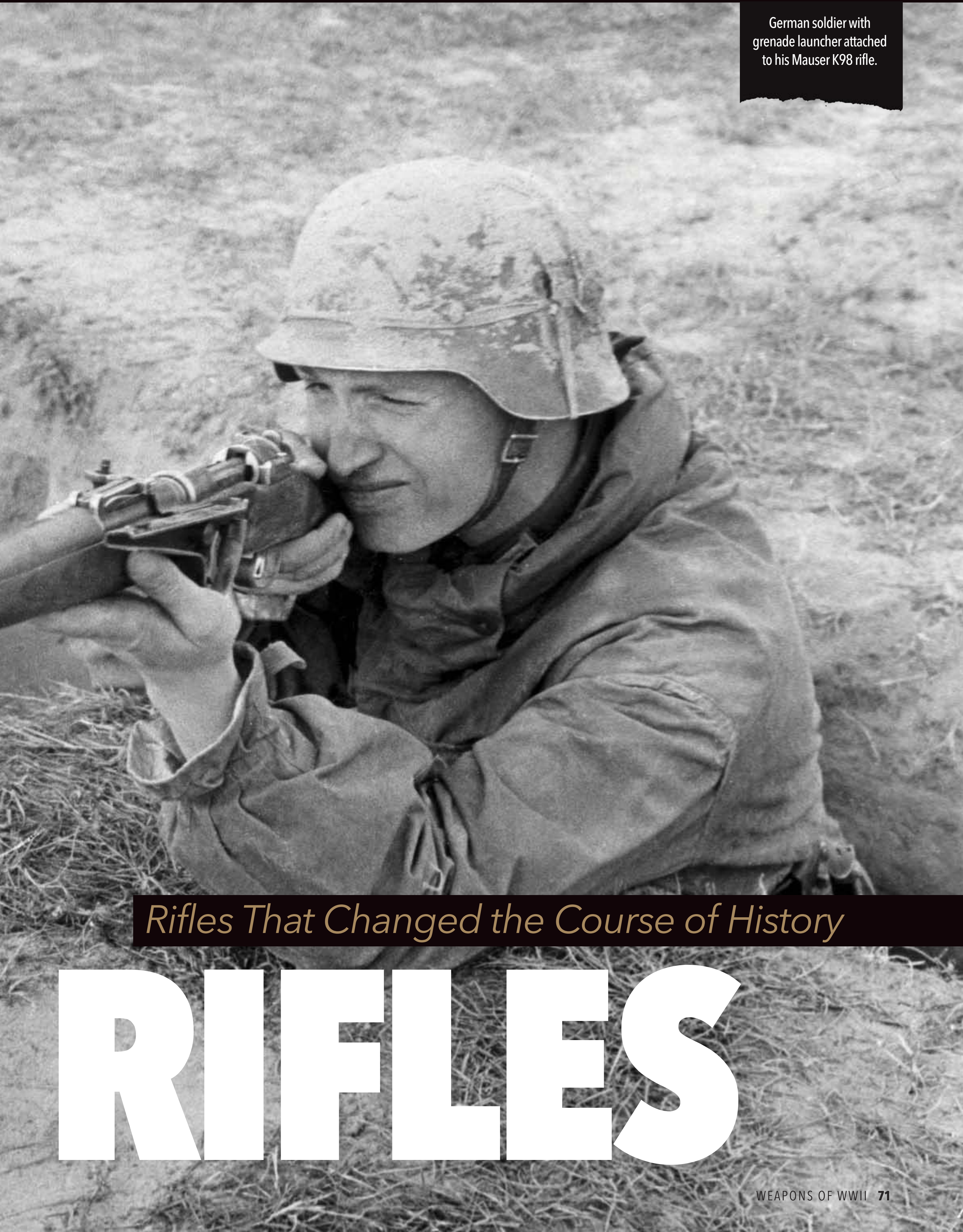
This design allowed for very fast operation; well-trained rifleman could perform "mad minute" firing that laid down 20 to 30 aimed shots in 60 seconds. As a result, many enemy after-action reports stated that their forces were turned back by heavy British machine gun fire, when in fact it had been the work of the British Tommies with their Lee-Enfields.

GERMAN MAUSER KARABINER 98 KURZ

Originally created as the Gewehr 98 (1898 Rifle), like the Lee-Enfield, the Mauser 98 transitioned through numerous revisions to arrive in the mid-1930s as the Karabiner 98 Kurz (short carbine 98), or more succinctly, K98K.



ULLSTEIN BILD / GETTY



German soldier with grenade launcher attached to his Mauser K98 rifle.

Rifles That Changed the Course of History

RIFLES

Lee-Enfield No. 4 Mk.1

Length: 44.75 inches
Weight: 9 pounds, 3 ounces
Magazine capacity: 10 rounds
Muzzle velocity: 2,441 fps

U.S. M1 Garand

Length: 43.5 inches
Weight: 9.5 pounds
Magazine capacity: 8 rounds
Muzzle velocity: 2,800 fps

German Mauser Karabiner 98 Kurz

Length: 43.5 inches
Weight: 9.0 pounds
Magazine capacity: 5 rounds
Muzzle velocity: 2,500 fps

German Sturmgewehr 44

Length: 37 inches
Weight: 10.2 pounds unloaded; 11.3 pounds loaded
Magazine capacity: 30 rounds
Muzzle velocity: 2,247 fps

Russian Mosin-Nagant 91/30

Length: 48.5 inches
Weight: 8.8 pounds
Magazine capacity: 5 rounds
Muzzle velocity: 2,838 fps

Japanese Type 99

Length: 44.1 inches or 50 inches
Weight: 8.2 pounds
Magazine capacity: 5 rounds
Muzzle velocity: 2,400 fps

The brilliance of Peter Paul Mauser's design is evidenced by the many rifles that followed his definitive design: controlled-feed bolt-action design with forward-mounted locking lugs plus a third lug, turned-down bolt handle and internal magazine fed from a five-round stripper clip. Not only found in contemporary battle rifles, these key features carry over today into many sporting rifles.

Chambered in the potent 7.92 x 57mm Mauser cartridge, the K98K upheld its role as the primary German service rifle through the end of the war. The K98K served in all branches of the German armed forces, with millions of rifles used throughout every theater of war.

Because German Army tactics centered on a belt-fed fully automatic machine gun assigned to every squad, the K98K's slower rate of fire was hardly considered a handicap.

As the state of the art in battlefield rifles progressed during the war years, however, the advantages of semi-automatic rifles and full-auto weapons, plus detachable magazines for quick reloads, became apparent. Plans were laid to replace the K98K with a more modern rifle, but the curtain fell on Nazi Germany before much progress could be made.

GERMAN STURMGEWEHR 44

Developed late in the war to replace the K98K, Germany's selective-fire Sturmgewehr 44 had little impact on the eventual outcome. However, we've named it a top World War II rifle because its numerous innovations set the stage for many of today's military rifles.

Sturmgewehr, abbreviated as StG, translates to "storm rifle" with the word "assault" serving as the definition of "storm" in this context. And so we have here the world's first assault rifle that defined the class then and now.

The StG 44 was built around an intermediate-power cartridge, the 7.92x33mm Kurz (short), which produced lower muzzle velocities and therefore delivered less power. But it gained significantly more control in automatic fire mode. It was deemed effective at ranges up to 300 meters, which served well under most actual battle conditions. As its name states, it incorporated a full-diameter 7.92mm bullet, albeit one that was lighter in weight (125 grains) than the bullet used in the 7.92x57mm K98K cartridge (197 grains).

Because much of the rifle—especially the receiver—could be made from steel stampings, the Sturmgewehr was faster, easier, and more efficient to build than a K98K, although production required more sophisticated machinery.

The rifle, fed by a 30-round detachable box magazine, offered an impressive firing rate of 550 to 600 rounds per minute. The basic form, construction and cartridge format is said to have influenced the development of Russia's famous post-war assault rifle, the AK-47.

JAPANESE TYPE 99

Due to shortcomings borne out in combat with the previous-generation Type 38 bolt-action rifle, the Imperial Japanese Army developed the Type 99 and placed it into service in 1939.

This new rifle was chambered in the more powerful 7.7x58mm Arisaka cartridge that was already being used in IJA machine guns to provide a marked improvement over the Type 38's 6.5x50mm cartridge.

Although the Type 38 was slated for full replacement by the 99, due to wartime needs both rifles continued in service all through WWII; this dual-cartridge demand complicated army logistics and resupply.

Post-war testing proved the actions of both rifles to be very strong, and early samples show fine workmanship comparable to commercial rifles. The bolt cocked on closing and the rifle came equipped with a sliding bolt cover and a monopod. Neither accessory proved very practical.

The Type 99, which came in long and short versions, was the first rifle equipped with a tough and durable chrome-lined bore to aid in cleaning and to resist corrosion in damp environments. Strangely, it also incorporated anti-aircraft sighting arms on the rear sight assembly to help soldiers calculate lead when firing at a moving airplane.

RUSSIAN MOSIN-NAGANT

There's the notion that “quantity has a quality all its own,” and that idea certainly applies to the Russian Mosin-Nagant rifle. First adopted by the Russian military in 1891, production continued through 1965 with the total number built adding up to more than 37 million rifles. That number alone qualifies the Mosin-Nagant as a top rifle of World War II.

The Model 1891/30 was standard issue at the beginning of the war and by war's end, approximately 17.4 million had been produced. Shorter carbine variants, the M38 and M44, were issued to support troops who worked

GETTY IMAGES; THINKSTOCK PHOTO

U.S. ARMY CENTER OF MILITARY HISTORY

ABOVE: Japanese soldiers armed with bolt action rifles, bayonets attached, prepare for battle against the Chinese.
BELOW: Germany's selective-fire Sturmgewehr 44 used the shorter 7.92x33 mm cartridge that allowed it to be controllable in full auto.

> **" ... WELL-TRAINED RIFLEMAN COULD PERFORM 'MAD MINUTE' FIRING THAT LAID DOWN 20 TO 30 AIMED SHOTS IN 60 SECONDS."**

Compare the Numbers

20 to 30

The number of aimed shots in 60 seconds that a well-trained soldier could do with a British Lee-Enfield

7.92 x 57mm

The cartridge used in the Karabiner 98 Kurz

550 to 600

The number rounds per minute the German Sturmgeweher 44 could shoot

37

In millions, the number of Russian Mosin-Nagant rifles produced

GETTY IMAGES

behind the front lines, such as signal corps, artillerymen and engineers.

All variations shared the same basic configuration: bolt action with two forward-mounted locking lugs, with a 5-round internal magazine fed with stripper clips.

Interestingly, Finland, which declared its independence from Russia in 1917, fought two wars against the Soviet Union during World War II: the Winter War of 1939 to 1940, and the continuation War of 1941 to 1944. After reaching an armistice with the Soviet Union in the summer of 1944, Finland then fought the Lapland War against the Germans in 1944 to 1945. In all of these conflicts the Finnish Army used Mosin-Nagant rifles they produced domestically.

U.S. M1 GARAND

British author H. G. Wells optimistically called the World War I, "The war to end war," but few realistically held out such hopes. And so after that conflict concluded, even though U.S. forces were already fully equipped with the excellent M1903 Springfield bolt-action rifle, the Army began a series of trials in the 1920s, in search of a new main battle rifle.

These extended tests and trials were finally concluded in 1937 with deliveries to the Army of the first U.S. Rifle, Caliber.30, M1, commonly called the M1 Garand after its designer John Garand.

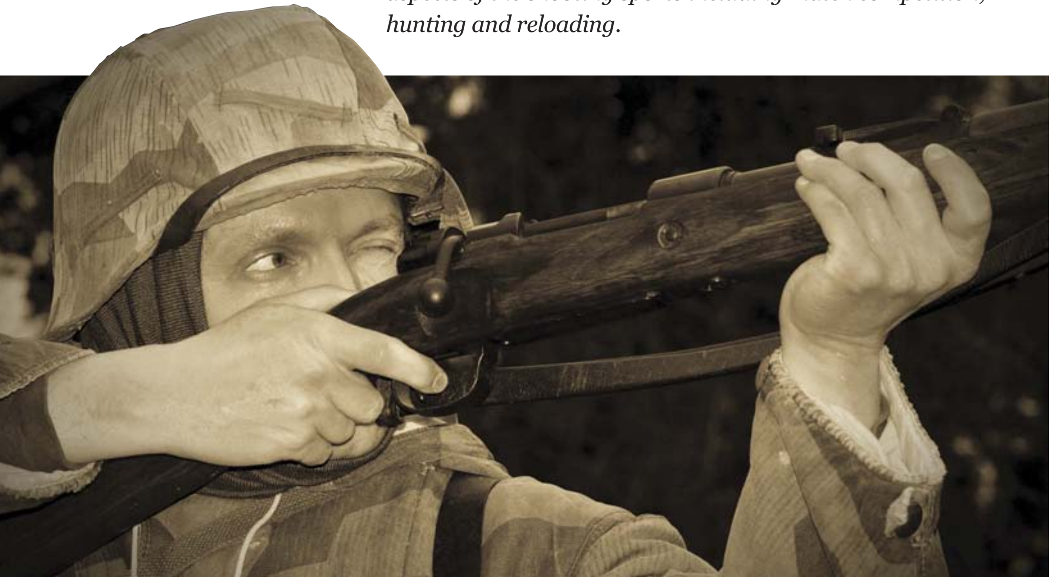
With that change, the USA became the sole world power to equip its forces with a semi-automatic rifle as its main weapon, rather than a bolt-action. The M1 Garand is a gas-operated semi-automatic rifle firing a full-power cartridge, the .30 M1 ball ammunition. That ammo was already in stock to feed the M1903 Springfield rifles and .30-caliber light machine guns, thus simplifying supply logistics.

The M1 Garand is fed by an en-bloc clip holding eight rounds that is inserted into the rifles action. As the last round is fired, the spring-metal clip ejects with an audible and distinctive "ping."

Having the M1 Garand as standard issue, squad-level firepower increased dramatically, giving U.S. forces a heavy edge in firefights. General George Patton, who was well known for his frequent theatrics, called it "the greatest battle implement ever devised." But in this case, he was exactly right. **WOW**

KM Lee is a lifelong shooter and an active participant in all aspects of the shooting sports including match competition, hunting and reloading.

German soldiers carried the Mauser k98 bolt action rifle into battle and were usually supported by a belt-fed machine gun.


THINKSTOCK PHOTO

American infantry soldiers take aim during the Battle of the Bulge. The two on the ends have M1 Garands. The soldier in the center has a B.A.R.

A U.S. soldier show off a captured Japanese bolt action rifle (left). The rifle carried by the soldier on the right is an M1 Carbine.

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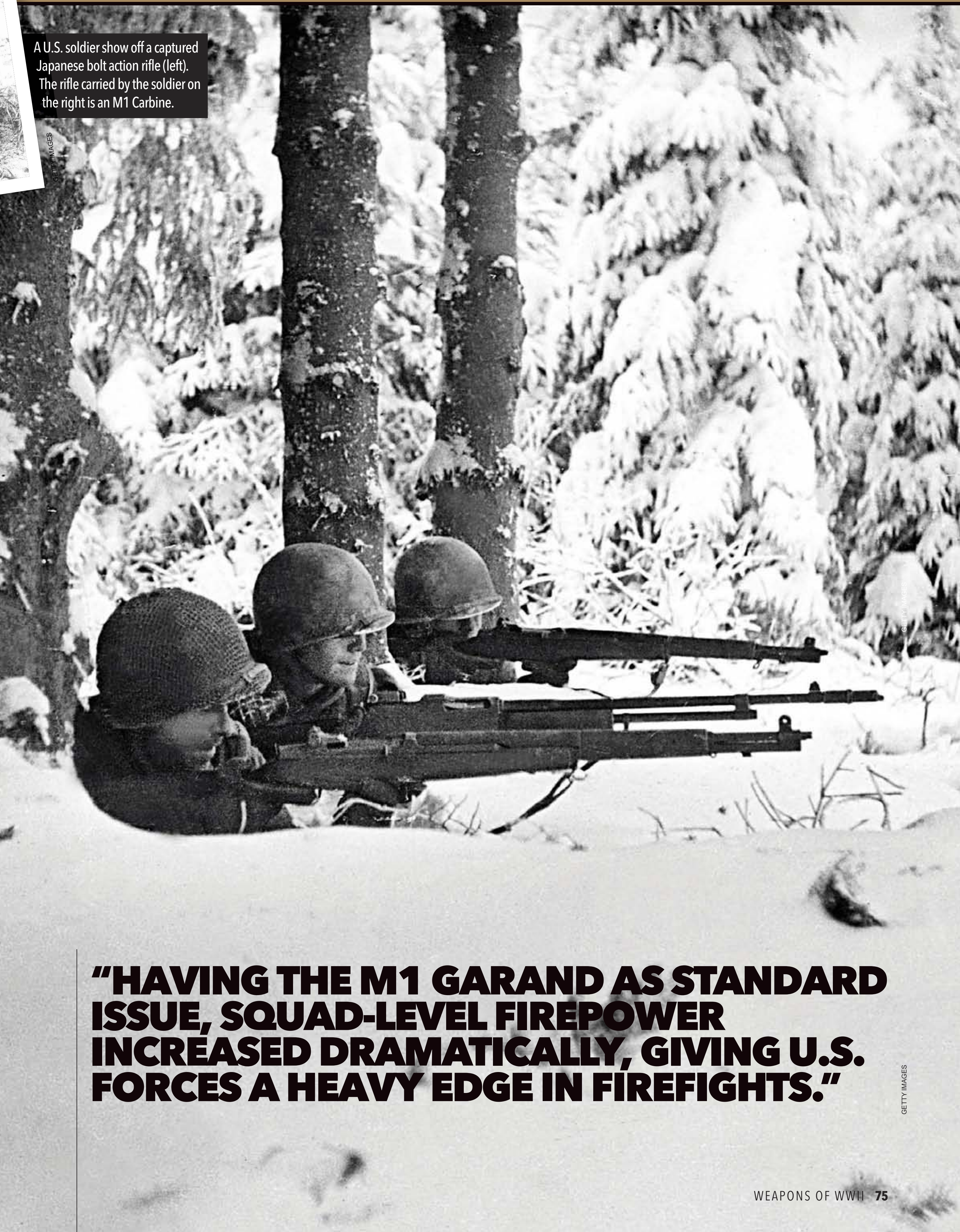

GETTY IMAGES

> **“HAVING THE M1 GARAND AS STANDARD ISSUE, SQUAD-LEVEL FIREPOWER INCREASED DRAMATICALLY, GIVING U.S. FORCES A HEAVY EDGE IN FIREFIGHTS.”**

GETTY IMAGES

TEXT & PHOTOS BY
BOB CAMPBELL

U.S. Marine trains with his 1911 pistol at the ready.

ABOVE RIGHT: An American soldier, pistol in hand, disarms a German prisoner in France, June 1944.

PHOTOQUEST/GETTY IMAGES

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TRUSTED COMPANIONS

The Greatest Handguns of the War Were Proven In Battle

Handguns were vitally important during World War II.

The Germans used literally dozens of types, whatever could be pressed into service, and many American soldiers, sailors and pilots carried handguns. The same was true of most of the Axis and the Allies as well.

The reasons for carrying the handgun differed. Americans liked to have a handgun for short range use. The Germans had to arm every soldier stationed in occupied areas, including doctors and clerks. They were not popular as an occupying army. Tank crewmen and aircraft crew alike had the handgun in case they had to abandon their war machines.

Sidearms were often carried by officers, but the demands of combat and occupation are harsh and many soldiers carried handguns. Ammunition bearers and machinegun operators routinely carried handguns as backup.

It would be difficult to cover the arms used even by a single major combatant, but we'll feature some of the more prominent ones. Each one got into the fray and served well. A number are still in production, although in different versions. Some of the pistols used were extremely influential on future development. Others, such as the Webley revolvers, were a technological dead end.

Let's now look at the some of the greatest.

The Walther P38 replaced the Luger as Germany's standard sidearm. Its double-action design with decocker is used on some pistols to this day.

WALTHER P38

The Browning-designed pistols were rugged, but the much newer P38 was easily the most modern handgun of the war. Well made of good material in all but late war production, the P38 is also among the most accurate handguns of the war.

It was designed with a double action first shot trigger, a slide mounted decocker/safety lever and chambered the 9mm Luger cartridge. The Walther replaced the Luger as Germany's front line handgun. The P38 was adopted in 1938 and production continued until the end of the war. After World War II, the P38 and later the P1 (an aluminum frame P38) equipped the reconstituted German Army.

Interestingly our own Beretta 92 service pistol is simply a modified high capacity variant of the Walther P38. The P38 was easily one of the most influential handguns of the war. I have fired these pistols extensively. Interestingly, the Walther will feed modern jacketed hollow point ammunition easily.

Key Points

- One of most accurate guns of World War II
- For Germany, it replaced the Luger

COLT 1911A1

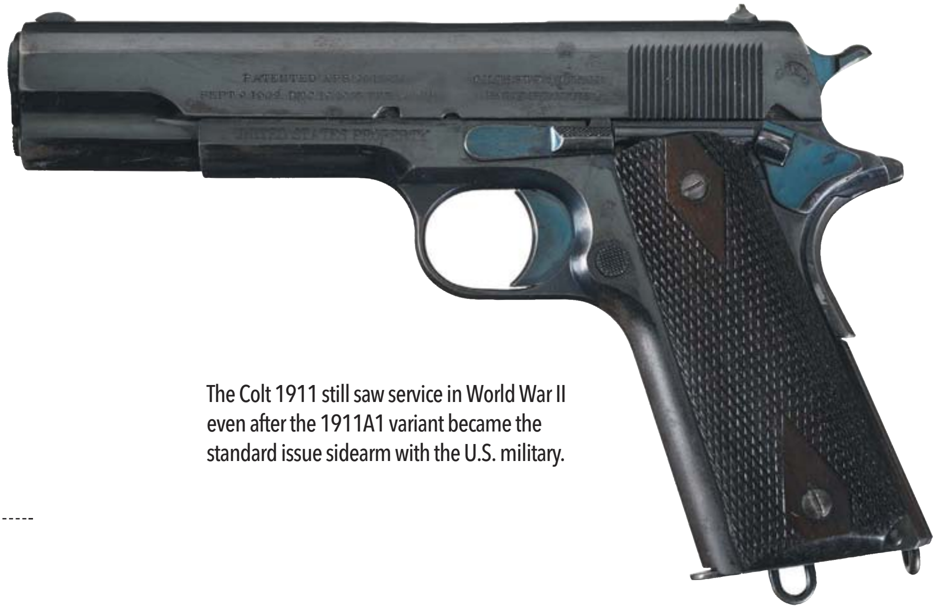
One of the most distinctive handguns used during World War II was the Colt 1911A1 .45 automatic, often simply called the Colt or the .45. Designed by John Moses Browning, it was the only pistol used during the war to combine a big bore cartridge with a self-loading action. The Colt 1911 is still in use by elite military units and any soldier that can obtain one.

Though the pistol produced during World War II was the 1911A1 variant, many of the 1911 types manufactured during World War I were also used. Those earlier models were not relieved on the frame behind the trigger guard for increased finger clearance and there were other small detail changes.

The 1911 is regarded as the most reliable self-loader of the period, although a properly maintained Browning High Power is at least as reliable. No other military handgun carried the shock and power of the Colt 1911A1. The pistol was also manufactured by Remington Rand, Ithaca and others during the war.

Key Points

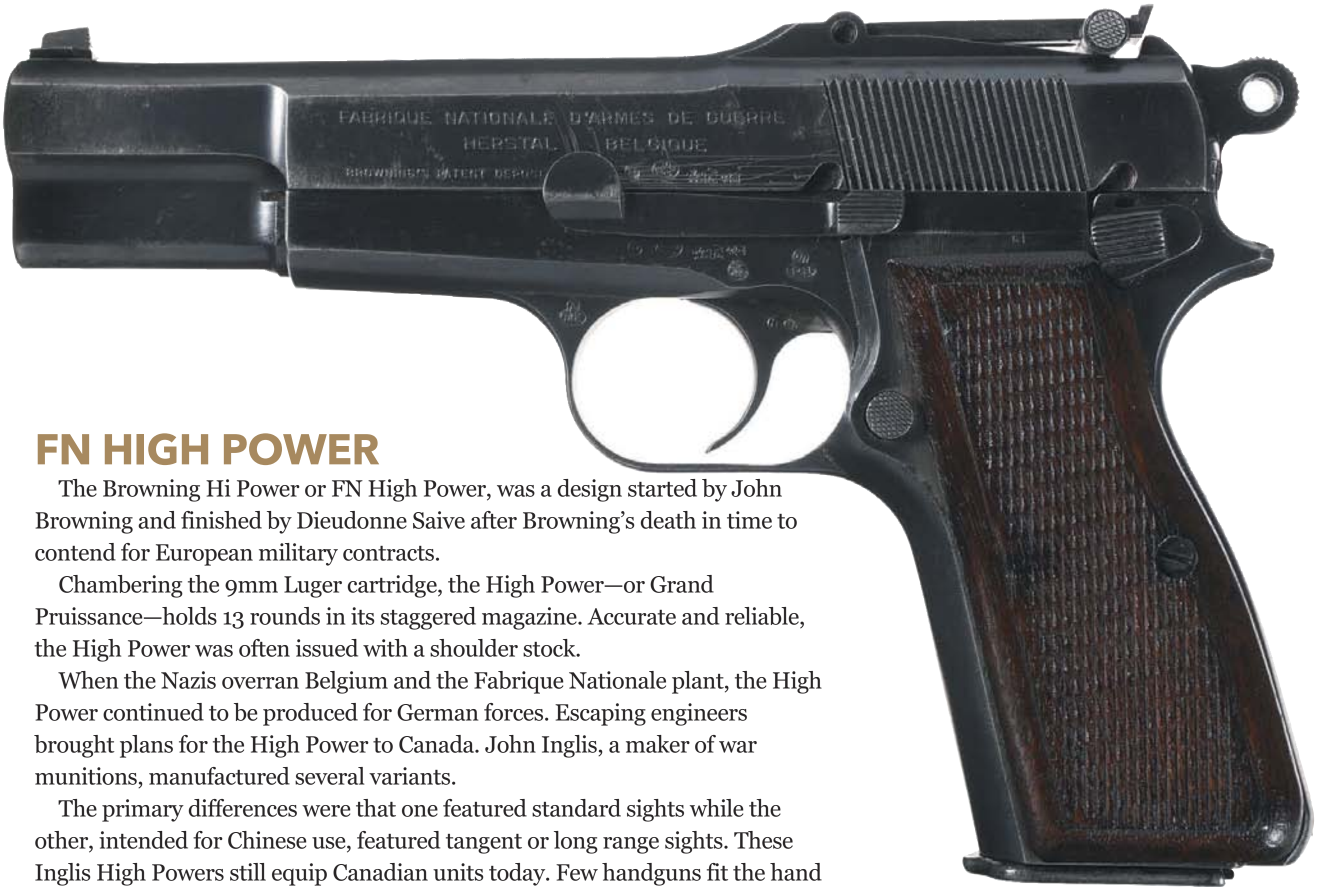
- The 1911 is still used by elite military units
- Considered the most reliable self-loader during this period



The Colt 1911 still saw service in World War II even after the 1911A1 variant became the standard issue sidearm with the U.S. military.

ROCK ISLAND AUCTION PHOTO

"[THE FN HIGH POWER] IS A GREAT HANDGUN THAT, ALONG WITH THE 1911, IS STILL IN USE ANYWHERE THE WAR DOGS BARK."



FN HIGH POWER

The Browning Hi Power or FN High Power, was a design started by John Browning and finished by Dieudonne Saive after Browning's death in time to contend for European military contracts.

Chambering the 9mm Luger cartridge, the High Power—or Grand Pruissance—holds 13 rounds in its staggered magazine. Accurate and reliable, the High Power was often issued with a shoulder stock.

When the Nazis overran Belgium and the Fabrique Nationale plant, the High Power continued to be produced for German forces. Escaping engineers brought plans for the High Power to Canada. John Inglis, a maker of war munitions, manufactured several variants.

The primary differences were that one featured standard sights while the other, intended for Chinese use, featured tangent or long range sights. These Inglis High Powers still equip Canadian units today. Few handguns fit the hand better. With the Winchester USA ammunition that I tried recently, the pistol was accurate enough for any chore. It is a great handgun that, along with the 1911, is still in use anywhere the war dogs bark.

Key Points

- Initial design by John Browning
- Accurate and reliable

The FN High Power was a design started by John Browning and finished by Dieudonne Saive after Browning's death. This handgun was used by military units around the world.

ROCK ISLAND AUCTION PHOTO

COLT 1917 REVOLVER

Among the most overlooked war dog is the Colt 1917 revolver. The Colt New Service revolver was introduced in 1897 and was in production through 1940. The Colt New Service served both American and Allied servicemen well, not to mention the Royal Canadian Mounted Police and the New York State Police. Some 360,000 New Service revolvers were made during its long life span in eleven calibers.

The revolver was used in the Philippines, in the Banana Wars in South America and in both World Wars. The New Service was originally chambered in .45 Colt, but the 1917 variants were chambered in .45 ACP for U.S. troops and in .455 Webley for the British during World War I.

Some 96,000 were still on hand when we entered World War II. The .45 ACP is a rimless cartridge designed for semi-autos. The Colt revolver was designed to take sheet metal half moon clips holding three cartridges to allow for both chambering and ejection of this cartridge in a revolver. The result was one of the fastest revolvers to load and unload in history.

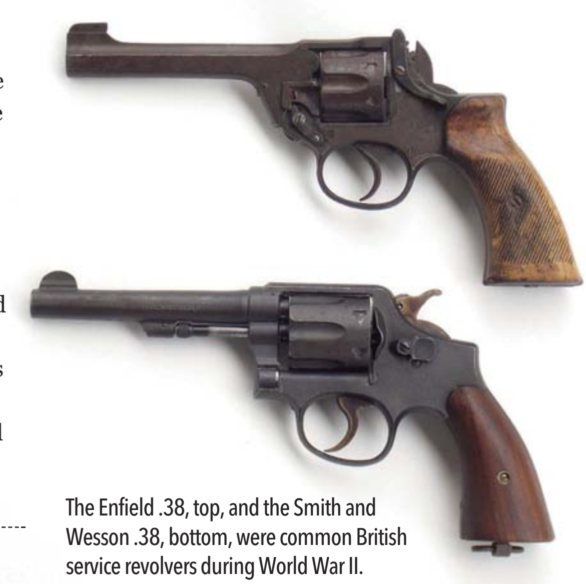
The Colt 1917 was put to use due to a shortage of Colt 1911 pistols. Though primarily issued by support troops, military police and tankers, some preferred the big revolver to the 1911. I have read period reports of the 1917 being used by Seabees in the Pacific as one example.

The rugged and reliable Colt 1917 was a true heavy duty revolver that gave a trained shooter every advantage. The 1917 was accurate and the trigger action was smooth. In common with the Colt 1911, examples used in service during World War I were blued. Those used during World War II, for the most part, featured a parkerized finish.

Key Points

- Rugged and reliable
- Used in a number of wars

"AMONG THE MOST OVERLOOKED WAR DOG IS THE COLT 1917 REVOLVER."



The Enfield .38, top, and the Smith and Wesson .38, bottom, were common British service revolvers during World War II.

BRITAIN'S REVOLVERS

Britain went to war with revolvers of a design dating to the late 1800s. Originally offered in .455 Webley chambering, it featured a double-action trigger and top-break action with simultaneous ejection. It might be argued that the Webley was the most advanced combat revolver ever produced.

Speed loaders were not common but they were manufactured, and today original speed loaders bring a premium among collectors.

After World War I, the British elected for a lighter handgun chambering a short .38 caliber cartridge. Loaded with a 200 grain bullet the .38-200 was dimensionally identical to the American .38 Smith & Wesson cartridge.

The Enfield revolver adopted for use by the army featured a spurless hammer and double-action-only design. The spurless hammer was developed after an accident with the original spur hammer revolver inside a British tank. The Enfield arsenal revolver design was so similar to the Webley that Webley sued the government over the design and won.

During World War II, the Webley and Enfield were each manufactured for the British Army. After the war, the Webley was used by many police agencies, including Singapore, and it was the last hoorah for the British gun industry.

The Enfield was the standard sidearm of the British Army until 1963 when it was replaced by the Browning High Power.

Key Points

- Some argue it is the most advanced combat revolver
- Police agencies used the Webley

SMITH & WESSON VICTORY MODEL

Over 571,000 Smith & Wesson Military & Police .38 caliber revolvers were delivered to the British Commonwealth during World War II. A "V" suffix indicated the revolver was a Victory Model. Many were used by the United States to arm plant guards and other working with the war effort.

The British used theirs as front line handguns. The British revolvers were chambered for the .38/200 cartridge while American revolvers chambered the .38 Special cartridge.

Most were 5-inch barrel revolvers for the commonwealth and 4-inch barrels for the U.S. contract, but other variations exist. These revolvers were fast into action and handy as well as accurate.

A cost cutting measure adopted in the early days of production was to delete the rebound lever from production. However, after a revolver fell, discharged and killed a sailor, the rebound lever was reinstated in production. Revolvers modified from the original with the safety lever will have an S stamped on the sideplate.

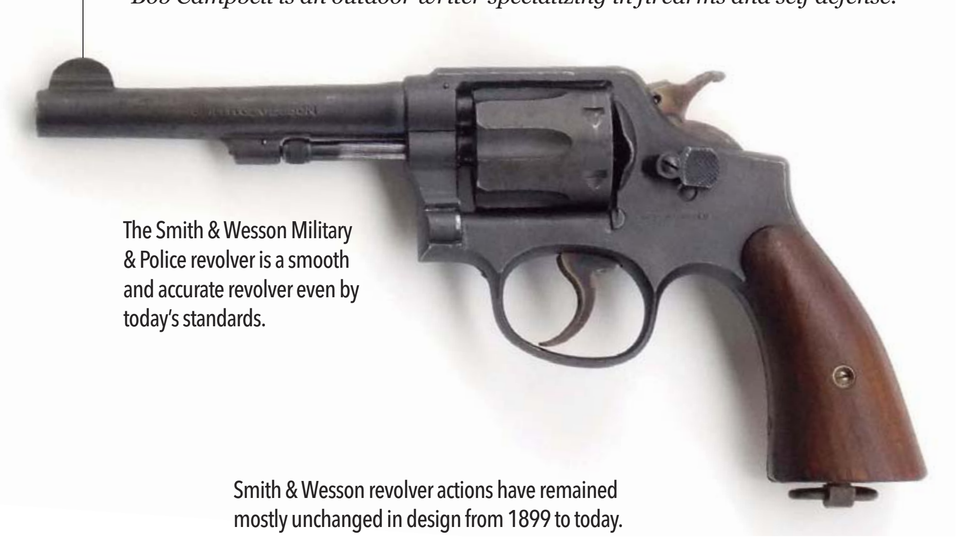
Key Points

- More than 570,000 delivered to British Commonwealth
- Accurate

HIGH-STORICALLY IMPORTANT

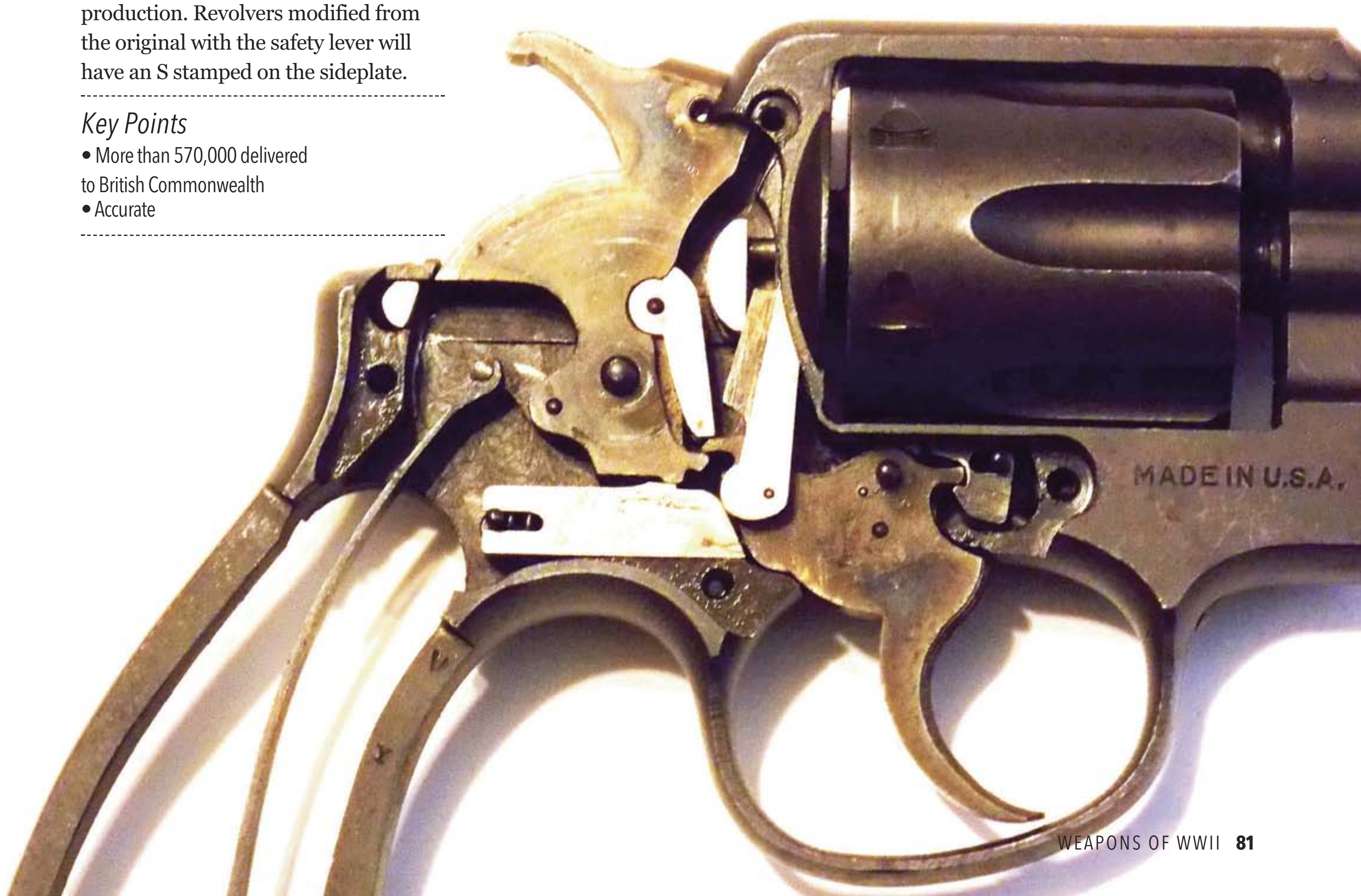
These war dogs were among the many weapons used during World War II. Not as modern as the jet fighter, radar or the bazooka, they were personal weapons that saw action in many battles. They are an important piece of history. **WOW**

Bob Campbell is an outdoor writer specializing in firearms and self defense.

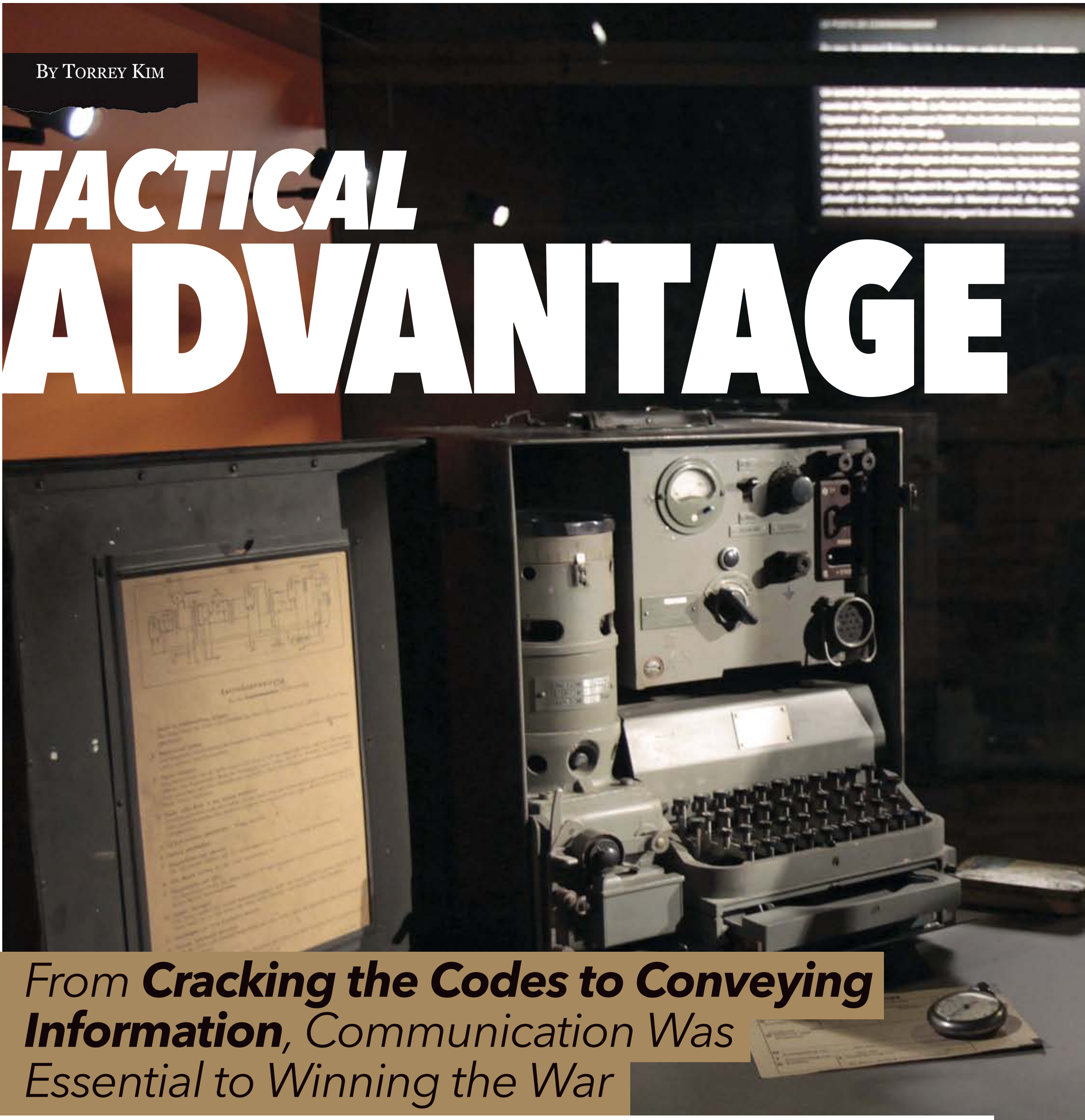


The Smith & Wesson Military & Police revolver is a smooth and accurate revolver even by today's standards.

Smith & Wesson revolver actions have remained mostly unchanged in design from 1899 to today.



By Torrey Kim



TACTICAL ADVANTAGE

From **Cracking the Codes to Conveying Information**, Communication Was Essential to Winning the War

Communication has changed dramatically since the 1930s and 40s.

Cell phones, texts, scanners and digital documents have replaced rotary dial phones, walkie-talkies, faxes and telegrams. We no longer have to wait hours, if not days or weeks, for information or intelligence; it's available almost instantly thanks to today's technology.

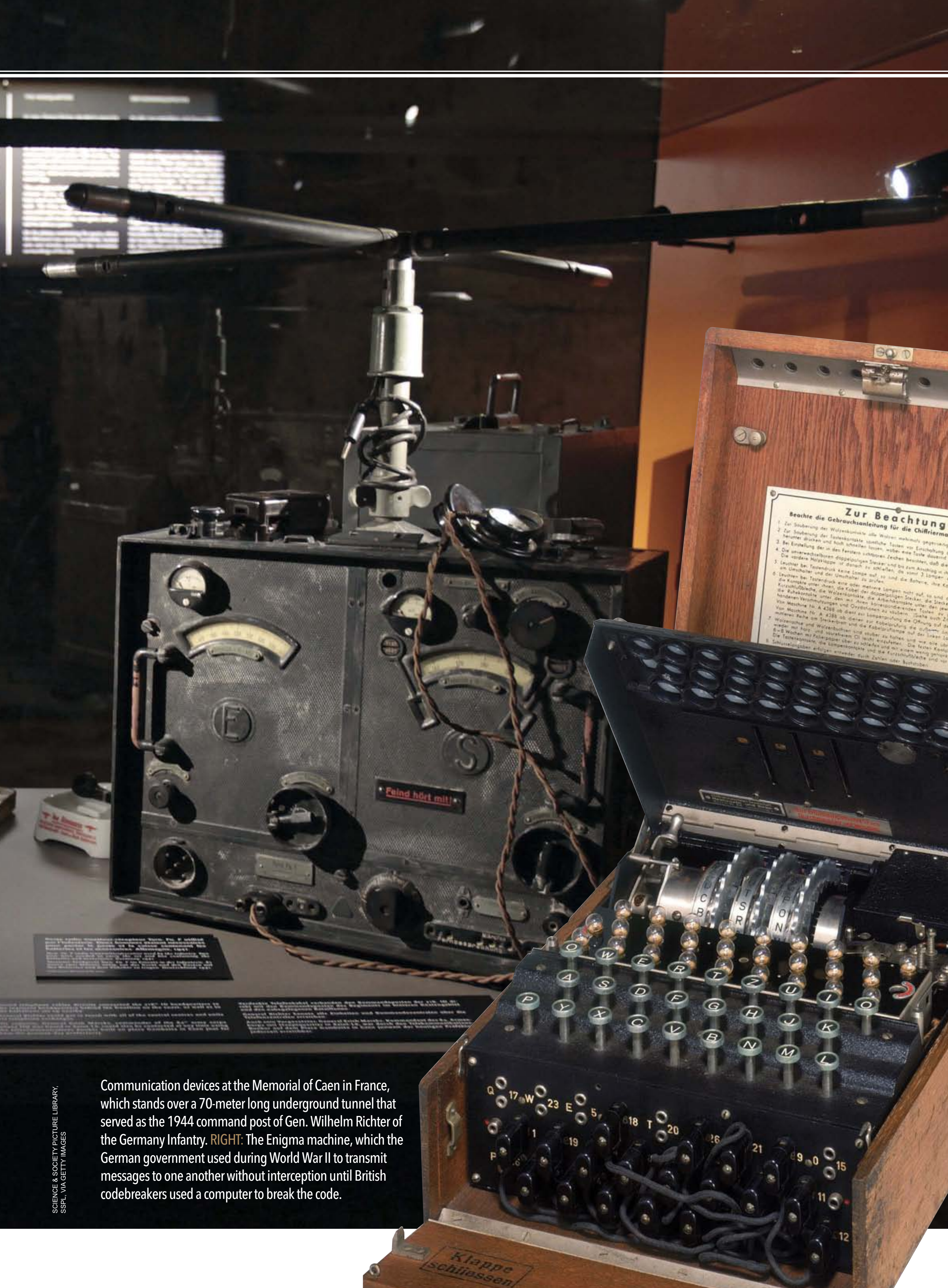
During World War II, however, many of those now-dated ways of communicating were relatively new—and they were the linchpins to winning the war.

The most intense fights were waged on battlegrounds all over the world, but many of them couldn't have been won without essential intelligence the armed forces gleaned using these communication devices.

SPEAKING ACROSS THE WORLD

During World War II, the Allied Forces wouldn't have been able to stay in sync with one another—or with their troops in the field—without daily dispatches that brought all of the information together into one central hub.

CHARLY TRIBALLEAU, AFP VIA GETTY IMAGES



Communication devices at the Memorial of Caen in France, which stands over a 70-meter long underground tunnel that served as the 1944 command post of Gen. Wilhelm Richter of the Germany Infantry. RIGHT: The Enigma machine, which the German government used during World War II to transmit messages to one another without interception until British codebreakers used a computer to break the code.

SCIENCE & SOCIETY PICTURE LIBRARY,
SSPL, VIA GETTY IMAGES

UNIVERSAL HISTORY ARCHIVE/GETTY

French soldier uses wired field phone.

That data was the end result of a flurry of communications that went from walkie talkies in the jungles to encrypted telegrams to the embassies and then back out to the field with specific defensive instructions.

The messages included news of victories, deaths, sinking ships and captured forces. They were the reason that thousands of Americans sat near their radios every evening for updates and why enemy forces were desperate to tap into the airwaves and spy on the information being shared.

This web of communications was a driving force during World War II, but not all of the devices were invented for the purpose of managing military information, according to Christos Triantafyllopoulos, a researcher of WWII military and intelligence history who manages the blogsite http://chris-intel-corner.blogspot.gr.

"In World War II, there was an explosion in the use of radio communications by military units but radio-telegraphy was not something new—it had been used for a long time—just not in such numbers," Triantafyllopoulos said. "The fact that all the participants came to rely so much on radio communications was a big breakthrough."

Other types of communication equipment used in large numbers included the spiral four cable and microwave towers, Triantafyllopoulos added.

The spiral four cable may not have been visible to those who relied on essential wartime communications, but behind the scenes, it made sharing information much more

U.S. soldiers make use of a field radio.

BOTTOM: Early in the war, the Germans had a big advantage with their communications systems.

FPG/GETTY IMAGES

efficient. The spiral four cable included carrier frequency equipment so that several teletype channels could be sent on the same line, allowing for more messages than ever before to flow at the same time.

Microwave towers allowed long distance communications to be transmitted wirelessly. The information would be relayed between two locations that contained directional antennas, meaning that the information could travel directly across an ocean. These communication types were commonly used during World War II by the U.S. military in both portable and station-based locations.

EVOLVING TECHNOLOGIES

When World War II started, it appeared as though the Germans were exponentially better equipped to communicate with one another than the Allied Forces, but that wouldn't remain the case forever, Triantafyllopoulos said.

"In the first half of the war, the German forces benefited from having radio-equipped tanks and planes," he said. "Radio-equipped military units could be controlled by a commander with little loss of time in sending and receiving orders. This was a big advantage."

By contrast, in France and in the Soviet Union, troops had large military forces but their communication systems were outdated.

GETTY IMAGES

ALLIES WERE WEATHER-WISE

When we think about World War II communications, our minds typically focus on the confidential tactical and strategic information that commanders sent to their troops. And although that was a huge and essential part of wartime messaging, it wasn't the only part.

Transmitting weather updates was also critical to the war effort and the timing was ideal—the U.S. Weather Bureau was gifted 25 radar units from the military just around the same time that the war started, giving the Americans a ready-made network of weather surveillance equipment so that the United States had the upper hand in predicting the weather.

Although we take weather forecasts for granted today, they were rare during World War II and the Americans troops' ability to access them were considered a tactical advantage.

"Weather forecasting played an important role in key battles that influenced the outcome of World War II, including the Battle of Midway in June 1942 and the decision to invade Normandy in June 1944," the U.S. Department of Commerce wrote in its history of the National Weather Service. "The Allies had the advantage of knowing weather conditions in the Western Hemisphere and over the Atlantic Ocean, which aided their success in battle."t

TCI/MARKA/GETTY

> **" … THOUSANDS OF AMERICANS SAT NEAR THEIR RADIOS EVERY EVENING FOR UPDATES AND … ENEMY FORCES WERE DESPERATE TO TAP INTO THE AIRWAVES AND SPY ON THE INFORMATION …"**

RADIOS A FORCE MULTIPLIER

When you look at the wide range of communication devices that existed or debuted during World War II, it can be hard to narrow down which was the most influential in changing the tactics of the war. But Triantafyllopoulos believes that radios were probably among the winners.

"The radio allowed military units to communicate with higher headquarters, tank units to control the operations of groups of tanks, airplanes to cover each other, etc.," he said. "The radio acted as a force multiplier."

TOP: Radios used in World War II were cumbersome by today's standards.

COMMUNICATION DEVICES

1. Walkie-talkies
2. Radios
3. Telegrams
4. Faxes

"Both the French and the Soviets relied on landlines and only a few radio stations," Triantafyllopoulos said. "During mobile operations, their system broke down and there was no way to quickly send messages. The result was that the Germans were one step ahead of their opponents."

Fortunately, technology for the Allied Forces quickly evolved during the course of the engagement.

"In the second half of the war, the Allies built up their own networks, even copying German equipment when it was found to be superior to their design," Triantafyllopoulos said. "By the end of the war, the U.S. had the largest and most advanced communications network with all kinds of equipment, including the walkie-talkie."

Known initially as a "handie talkie," the walkie-talkie represented a communications breakthrough for the U.S. Army Signal Corps during the war. The first iteration of the device that the Army used was technically titled the SCR-536, and was being mass produced by 1941 as a way for two-way communication between a base and the field, or by multiple soldiers in the field.

World War II also helped popularize the fax machine, which slowly replaced telegrams in getting weather information, news and photographs back and forth between military installations. In fact, long before most American consumers had even heard of fax machines, the Armed Forces were employing them regularly as the primary users of fax technology, even through the 1960s.

EMBRACING ENCRYPTION

Naturally, with so many military members talking to each other over radio waves, it was logical for opponents to try and intercept one another's messages. Although most armies used encryption methods to make their messages unreadable by their enemies, entire teams of scientists, mathematicians, soldiers and linguists worked tirelessly to crack these codes to gain a tactical advantage.

One of the earliest and most famous codebreakers during World War II was Alan Turing, a British math expert and cryptanalyst who led the British Government's code breaking effort. Using previous work by Poland as a springboard, Turing created an early computing device that was able to crack the code of Germany's Enigma machine, a previously-unbreakable encryption system.

According to the Oscar-nominated film "The Imitation Game," which profiled Turing's work, his encryption cracking system may have shortened World War II in Europe by up to four years.

American forces were also hard at work breaking codes during the war, and the Army and Navy were able to crack Japanese messages by the late 1940s using a cryptology system known as PURPLE. The Japanese forces had reportedly been warned that Americans were reading the PURPLE messages but were arrogant enough to dismiss the information, believing that their system was too sophisticated to crack.

Not all code cracking efforts involved hackers and high-tech codes. The Allied Forces were also known to pocket code books from enemy forces. Such was the case in 1941, when the German weather ship Laurenburg sank in the Arctic Ocean. British Royal Navy forces approached the sinking boat and collected its codebooks as well as pieces from an Enigma machine to contribute to the Allies' code cracking efforts. **WOW**

Torrey Kim is a North Carolina-based freelance writer who enjoys researching and studying U.S. history.

ABOVE: U.S. soldiers at an air base in Accra, Ghana, 1943, listen to a broadcast.
BELOW: Radio operators at Hitler's headquarters "Wolfsschanze" in East Prussia in 1941 or 1942.

IVAN DIMITRI/MICHAEL OCHS ARCHIVE/GETTY; ULLSTEIN BILD VIA GETTY IMAGES

ME 163 KOMET

The numbers on the German jet:

MORE THAN 300
the number of these jets built

30
the size in mm of the twin cannon on the jet

700
the top speed in mph

16:10
the kills-to-lost ratio

ADVANCED WEAPONRY

By KM Lee

ME 163 Komet

SECRET WEAPONS, HIGH-TECH DEVICES AND SPECIALIZED WEAPONS UP THE ANTE IN WORLD WAR II

In times of war, the capacity to invent new weapons to address evolving battlefield conditions flourishes. That was especially true during World War II when scientists on both sides worked on developing new secret weapons and updating other specialized weapons in an attempt to gain an advantage that might tip the scales in their favor. Here are a few examples:

HITLER'S SECRET WEAPON:

GERMAN FLYING WING BOMBER

They called it Hitler's "Secret Weapon."

It was designed to carry bombs of more than 2,000 pounds more than 600 miles at a rate of speed of more than 600 mph. Plus, the Horten Ho 229 was designed to fly at heights of up to 49,000 feet.

Designed by Walter and Reimar Horton, the Ho 229 featured wings that were carbon-impregnated plywood and two turbojets. The craft took its first flight early in 1944, and there were modifications after that flight. A fatal crash occurred during test flight three.

In addition to the bombs, the plane also had 2x30mm MK108 cannons and R4M rockets.

GERMAN MESSERSCHMITT ME 163 KOMET

In the late 1930s, Germany began development of a revolutionary aircraft design: the Messerschmitt Me 163 Komet, a rocket-powered plane capable of astounding speeds. By 1944, Komet test flights reached an amazing 700 mph. During this time the vaunted American P-51 Mustang fighter, in comparison, topped out at less than 440 mph.

Beginning in May 1944, the Me 163 entered combat and its unsurpassed velocity posed huge problems for Allied forces. Komets attacked singly or in pairs; a typical tactic had them dive through a bomber formation at 30,000 feet, quickly rise to 35,000 feet or more, then dive through the formation again. This tactic gave pilots two brief chances to attack before gliding back to their airfield. Pilots reported it was possible to make four passes on a single bomber flying alone.

Despite its speed advantage, the Me 163 was not terribly effective in real-world combat. It was a stable gun platform, but the Komet's twin 30 mm cannon produced a low muzzle velocity of only 1,800 feet per second. This resulted in severe projectile drop and an arcing trajectory that made hits feasible at only short distances.

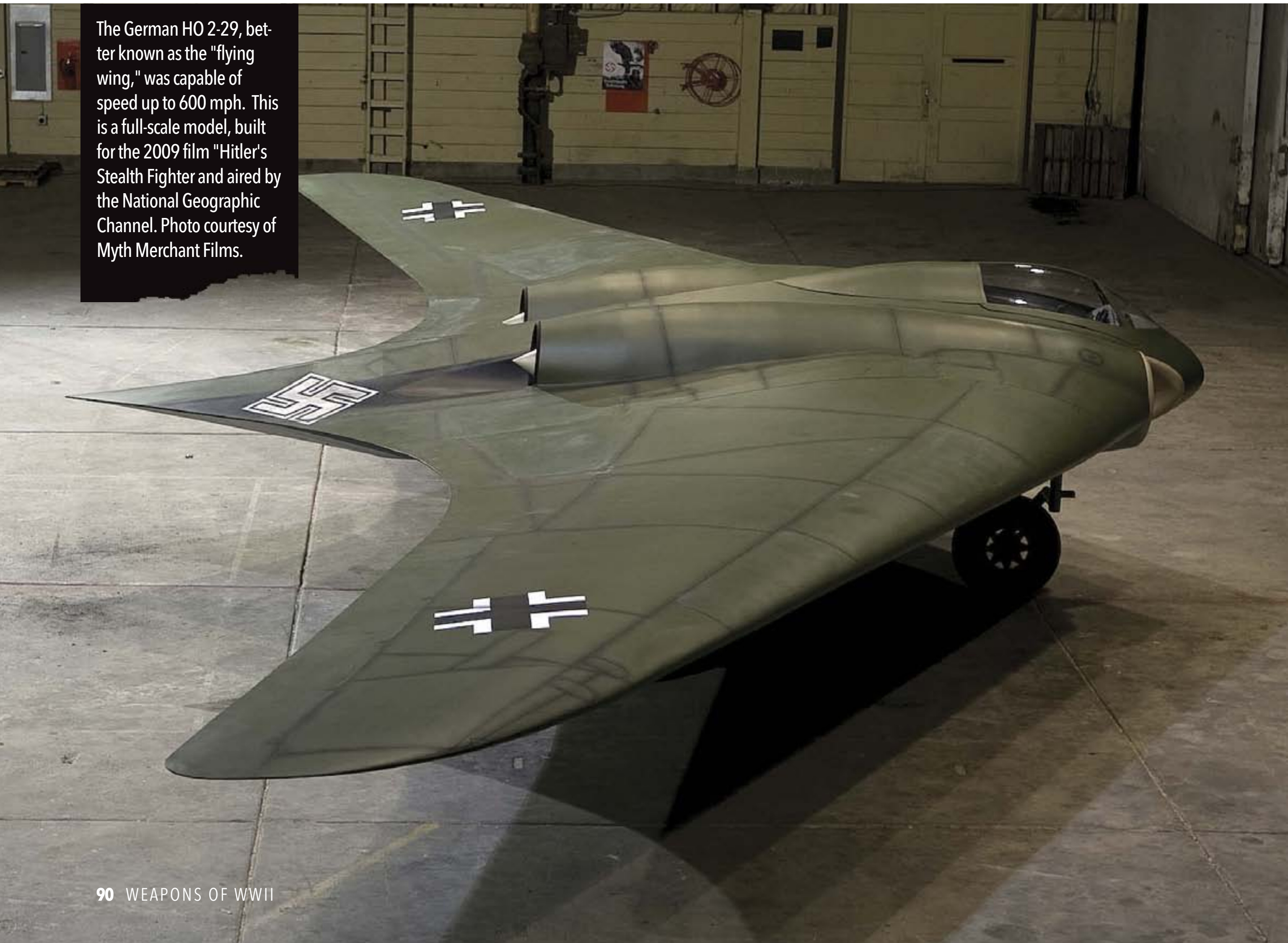
Such a combination made it extremely difficult to hit a slow-moving bomber as the Komet zoomed past, and four or five hits were typically needed to take down a B-17. In the end, more than 300 Komets were built, but it racked up few victories; 16 kills for 10 losses.

JAPANESE OHKA FLYING BOMB

Like Germany, Japan likewise developed a rocket-powered combat aircraft, but its application was very different. The Ohka (Cherry Blossom) was developed as the next phase in Kamikaze suicide attacks—a fast and large piloted bomb that cost one life in return for perhaps one entire enemy warship sunk.

The Ohka was essentially a 2,646-pound bomb with wooden wings, powered by three solid-fuel rocket motors. As such, it achieved great speed, albeit with very limited range. Unable to fly into combat on its own, the Ohka had to be carried under the fuselage of a slow, heavily laden Mitsubishi "Betty" bomber to within 23 miles of the target, making both it and its mother ship very vulnerable to defending fighters.

Diving into attack with its three rocket boosters, it could accelerate to 650 mph before crashing into the enemy ship. Such speeds made it extremely difficult to shoot



The German HO 2-29, better known as the "flying wing," was capable of speed up to 600 mph. This is a full-scale model, built for the 2009 film "Hitler's Stealth Fighter and aired by the National Geographic Channel. Photo courtesy of Myth Merchant Films.

A German V-2 rocket, another innovation, ready to be launched.

FOX PHOTOS/GETTY IMAGES

OHKA FLYING BOMB

The numbers on the Japanese bomb

1	The number of soldiers who manned each suicide bomb
3	The number of solid fuel rockets that powered it
23	The range of the bomb in miles
650	The top speed in mph
2,646	The pounds of explosives on board
MORE THAN 7,800	The number built

FRITZ X RADIO-GUIDED BOMB

THE UPSIDE
705-pound bomb guided to target by remote control

THE DOWNSIDE
The bomber that controlled it had to fly directly over the target where it was vulnerable to enemy fire

down with anti-aircraft fire. Despite more than 800 being built, only a few were actually used; the bulk being stockpiled in anticipation of the invasion of Japan, which never came.

The Ohka's operational record includes three ships sunk or damaged beyond repair and three other ships with significant damage. In light of its suicide mission, United States Navy sailors gave the aircraft the nickname Baka, Japanese for "fool" or "idiot."

GERMAN FRITZ X RADIO-GUIDED BOMB

If you want to accurately direct a big, airborne explosive charge without losing your pilot every time, what other method of bomb guidance might you employ?

For Germany, it was the Ruhrstahl SD 1400 X, better known as the “Fritz X.” Given the inherent difficulties associated with hitting and damaging a moving, heavily armored ship such as a cruiser or battleship, here was a guided anti-ship bomb designed to reliably guide a penetrating high-explosive charge on target.

Incorporating a dual-axis single joystick, a radio-control transmitter on board the deploying bomber sent control signals to the Fritz X, which picked up the signals through a receiver in the tail of the bomb. These signals controlled movable spoilers in the Fritz-X's thick vertical and horizontal tail fin surfaces.

Carrying a 705-pound payload, the Fritz X is considered by many to be the grandfather of the modern smart bomb. It proved to be highly successful in combat. However, to give it proper guidance the bomber had to fly directly over the intended target, thus leaving the aircraft dangerously exposed.

Later in the war the Allied forces developed ways to jam the radio signals directing the Fritz X bombs, and Allied air superiority further negated the threat posed by these big bombs.

REMOTE-CONTROLLED DEMOLITION VEHICLES

During World War II, the German Army developed a number of remote-controlled self-propelled demolition charges—exploding robots—that were deployed against Allied forces.

Some of these small tracked vehicles were wire-guided, like the Leichte Ladungsträger (light charge carrier) Goliath—nicknamed “doodlebugs” and "beetles" by the Allies. Others, called Funklenpanzer, relied on radio guidance. The Springer, which was much larger than the Goliath, was one of these.

In all, more than 7000 Goliaths were produced in three different variations. The first was powered by electric motors, while the following versions featured a twin-cylinder two-stroke 703cc Zundapp motorcycle engine. A remote-control joystick-style box connected to the vehicle via a trailing wire allowed the operator to send the Goliath toward its target: typically defensive positions and minefields, but sometimes toward

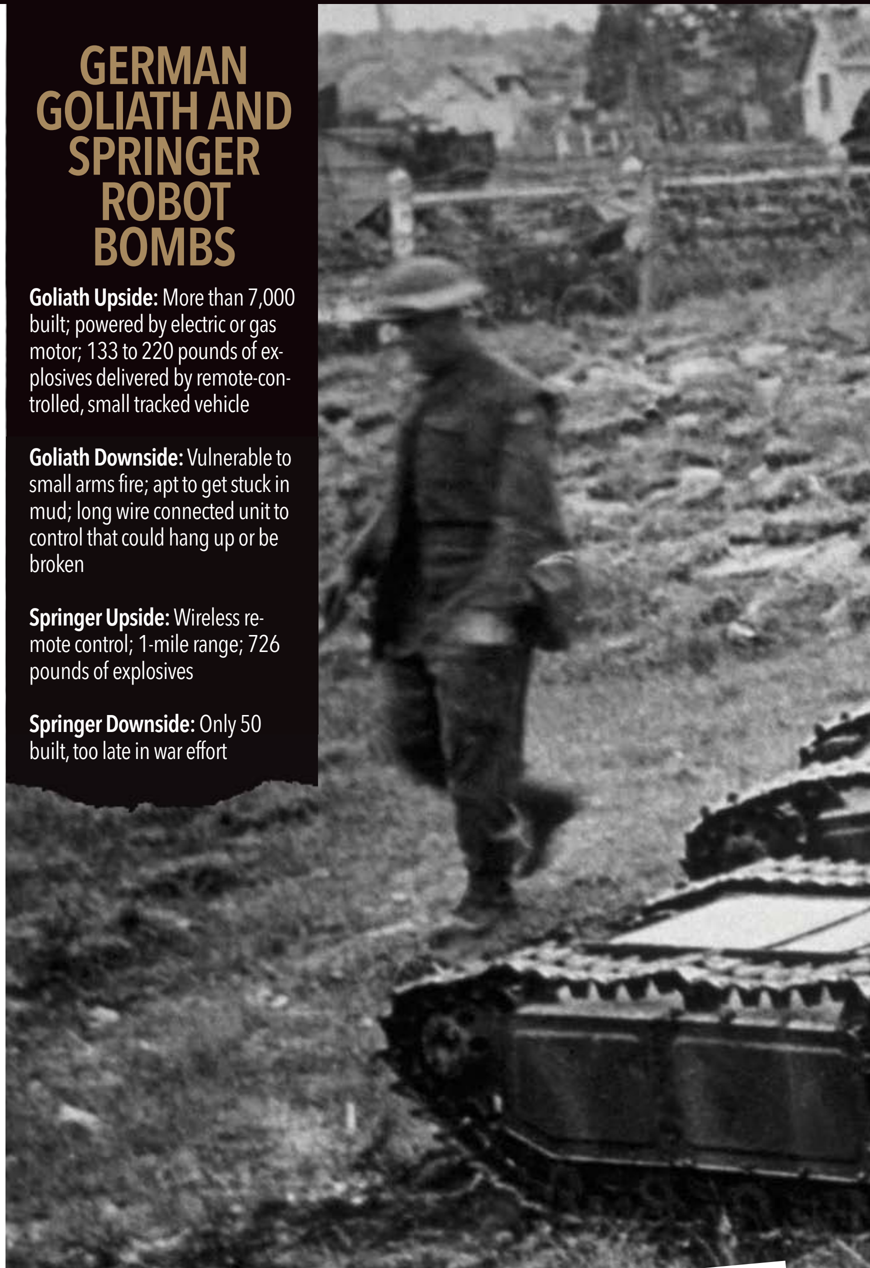
GERMAN GOLIATH AND SPRINGER ROBOT BOMBS

Goliath Upside: More than 7,000 built; powered by electric or gas motor; 133 to 220 pounds of explosives delivered by remote-controlled, small tracked vehicle

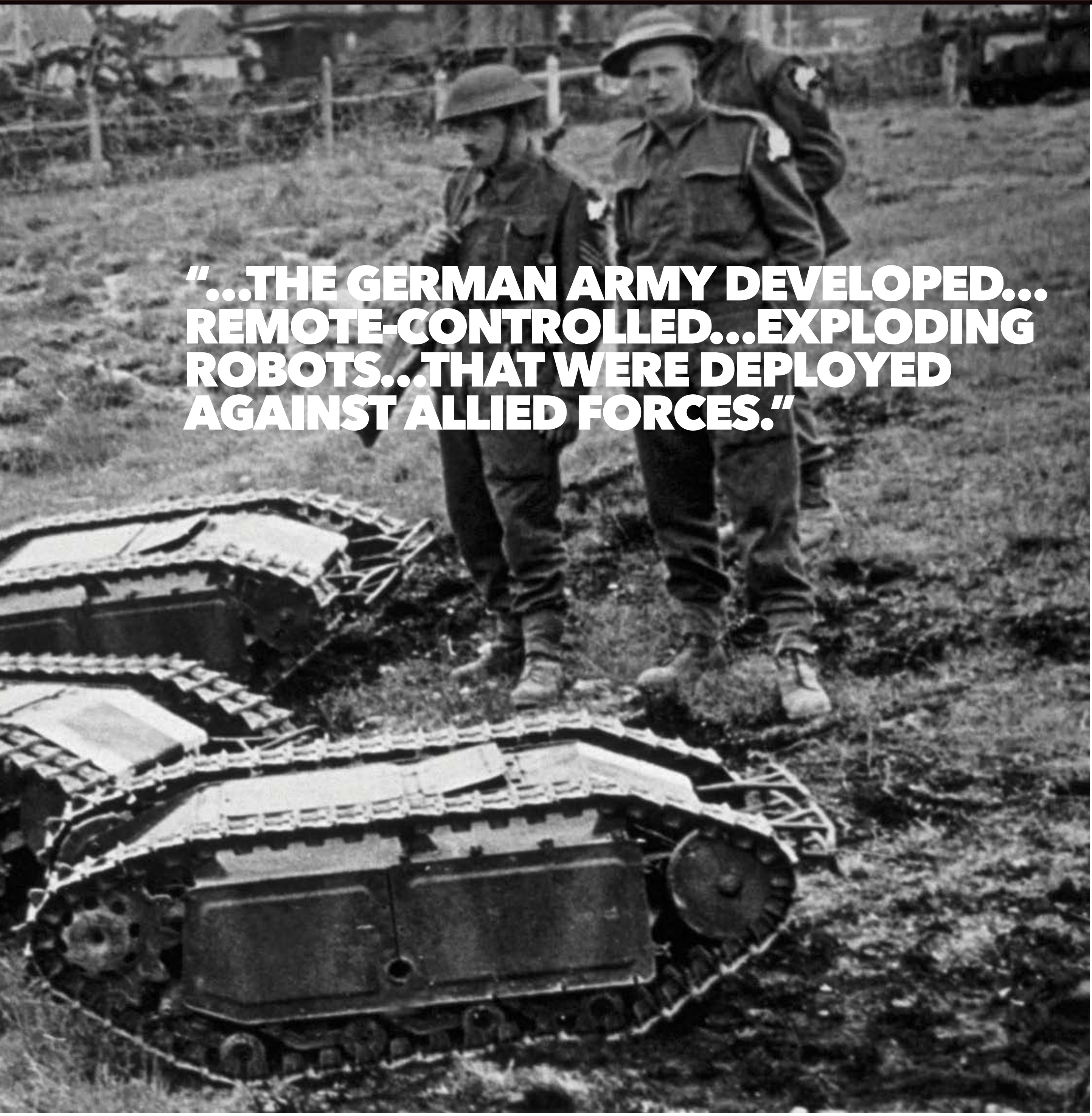
Goliath Downside: Vulnerable to small arms fire; apt to get stuck in mud; long wire connected unit to control that could hang up or be broken

Springer Upside: Wireless remote control; 1-mile range; 726 pounds of explosives

Springer Downside: Only 50 built, too late in war effort



The design for the U.S. bazooka was copied by the Germans during the war.



“...THE GERMAN ARMY DEVELOPED... REMOTE-CONTROLLED...EXPLODING ROBOTS...THAT WERE DEPLOYED AGAINST ALLIED FORCES.”

tanks and concentrated infantry positions.

The onboard explosive charge ranged in weight from 132 pounds to 220 pounds, with the electric-motor version offering the lesser capacity. Each Goliath measured just less than 5 feet in length, and a specialized two-wheeled trailer carried them to the battlefront.

Goliaths proved to be vulnerable to small arms fire, had trouble negotiating muddy ground and sometimes got stuck on steep hills, and the control wires could be easily severed. Despite these drawbacks they were considered to be fairly successful in combat. Perhaps more important, it paved the way for future post-war remote-controlled vehicle technologies.

Developed later in the war, the Springer was created by motorcycle producer NSU and employed many of the components of the Kettenkrad "motorcycle" half-track. A driver, who was protected by a lightly armored cupola made of folding steel plates, guided the Springer as close to the target as possible.

He then dismounted and folded the cupola down to protect the radio set that guided the vehicle via remote control. The radio control system had a maximum range of a mile or more, depending on conditions. Upon reaching the target, the

Springer's hefty 726-pound explosive charge was detonated by radio signal. Only about 50 were manufactured between October 1944 and February 1945, too late to significantly impact the war's outcome.

OTHER SPECIALIZED WEAPONS

Not all weapons used during the war used cutting-edge technology. There were many other specialized weapons that were updated and improved versions of devices that had been used in warfare for years.

FLAMETHROWERS

For centuries, armies have used fire as a most effective battlefield weapon. The successful use of Greek fire in battle was reported as far back as the 7th century. Modern flamethrowers came into use during the First World War and their use and effectiveness increased by the time of World War II.

Used by Germany, the USA, the UK, Japan, Russia and Italy, all man-portable flamethrowers follow a similar basic design. A backpack is used to carry one or more metal cylinders holding a flammable liquid plus high-pressure gas to propel a stream of burning liquid.

A flexible hose carries the liquid to a gun component that can be triggered to open a valve and ignite the stream of flaming liquid toward the intended target—most often trenches, bunkers and other fortified emplacements. An electrically heated wire coil or a small pilot flame were typically used as igniters.

One representative example, the American M2-2 flamethrower, combined a pair of 2-gallon fuel tanks with one tank of high-pressure nitrogen. When actuated, the M2-2 would send out a stream to a distance of 20 to 40 yards at a rate of a half-gallon per second. When filled, this setup weighed 68 pounds—a bulky, awkward and heavy load that required a big, strong soldier to wield it effectively in the field.

LAND MINES

A weapon that needs no soldier to man it, never tires and never sleeps: the land mine. The Chinese used explosive land mines as early as the 13th century, but World War II witnessed some interesting developments and greater-than-ever usage.

Land mines create defensive tactical barriers that channel attacking forces into preplanned fire zones or slow the invading force's progress. They also act as a passive area-denial tool that prevents the enemy's use of terrain or facilities even if active defense of the area is not possible.

Anti-tank mines were usually buried in roads or fields, and were set off by the weight of the vehicle as it rolled over the mine. Because foot soldiers cover a wider range of environments, anti-personnel mines could be buried in the ground, strapped in trees, placed in buildings and in a variety of other booby-trap settings.

They could be set off by the pressure of a footfall, but they also incorporated trip wires, and some would spring into the air to explode at waist height to spread damage even further.

German Tellermines, which held an 11-pound charge of TNT, were the most common type of anti-tank mines the allies faced. The S-mine (Schrapnellmine in German) was perhaps the most notorious German anti-personnel mine in the war. Nicknamed the "Bouncing Betty," when triggered, a black powder charge propelled a steel canister into the air where it exploded, sending hundreds of steel balls, steel rods or other metal pieces in a lethal radius of 100 yards or more.

Common practice combined S-mines along with anti-tank mines to resist the advance of infantry as well as vehicles. In preparation for the defense of the French beaches in Normandy, German General Erwin Rommel ordered S-mines to be "sown like grass seed," and they were, by the thousands.

PORTABLE ANTI-TANK WEAPONS

As tanks acquired tougher hulls, new weapons had to be developed to defeat thicker armor. High-explosive anti-tank (HEAT) charges were the answer; an explosive shaped charge would cut through thick armor that would otherwise defeat rifle bullets. So weapon designers soon developed a number of ways to get HEAT warheads on target.

The American "bazooka" is perhaps the most well known. Officially named Rocket Launcher, M1A1, the bazooka used a 2.36-inch rocket with solid rocket propellant for propulsion, fired from a reusable launcher. After German forces captured several bazookas in early North African and Eastern Front battles, they developed their own version—the Panzerschreck—and increased the warhead diameter to 8.8 cm (3.46 inches), which made it more effective, albeit significantly larger and heavier.

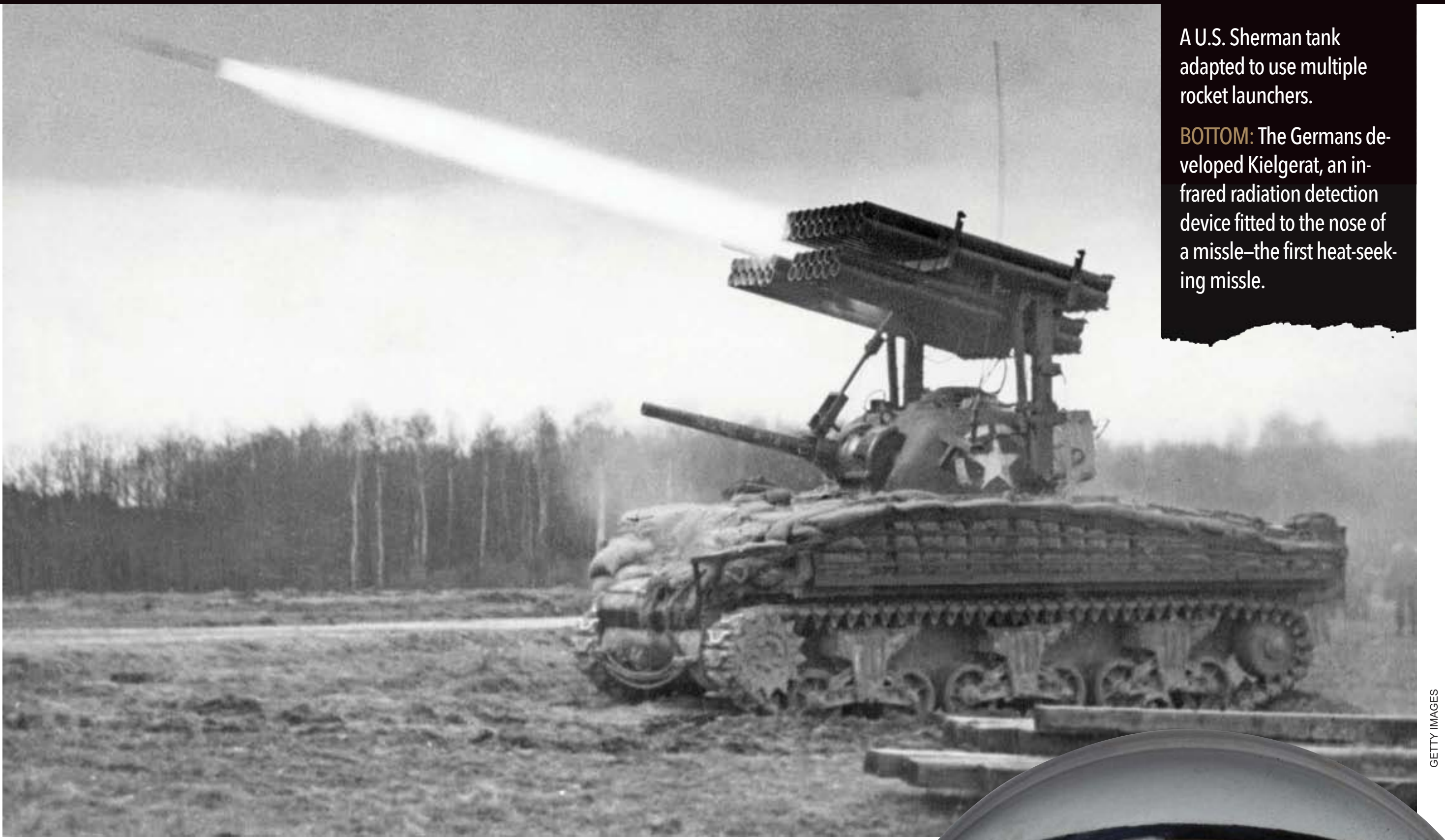
Germany's Panzerfaust family of weapons was another widely recognized anti-tank expedient. Warheads varied in size and effectiveness, but each was mounted on a wooden rod and featured spring-steel vanes that popped out to stabilize the warhead in flight.

The wooden mounting/carrying rods were designed to be expendable, and they contained the percussion propelling charge that sent the warhead on its way. Variants measured from 100mm to 149mm in diameter, with effective range spanning 30 meters to 150 meters. All could be very effective against tanks, especially in close-quarter urban fighting.

MULTIPLE ROCKET LAUNCHERS

Once your enemy is located, you want to rapidly bring to bear as much firepower as possible. The German Nebelwerfer and Russian Katyusha series of rocket launchers allowed just that, and with impressive results.

Developed in the 1930s, the Nebelwerfer and Katyusha both use recoilless rocket launchers ganged together in multiple launch tubes or on simple metal racks. Such setups could be mounted on trucks, trailers, half-tracks or converted



A U.S. Sherman tank adapted to use multiple rocket launchers.

BOTTOM: The Germans developed Kielgerat, an infrared radiation detection device fitted to the nose of a missle–the first heat-seeking missle.

GETTY IMAGES

tank chassis for easy mobility and deployment. The launchers held anywhere from five or six tubes up to dozens of rockets held in rack configuration.

Multiple rocket launchers deliver large quantities of heavy payloads to a target area more quickly than conventional artillery, but with lower accuracy and a longer reload time. The launchers are fragile compared to artillery guns, but are inexpensive and easy to produce. Their light weight and easy mobility also gave these rocket launchers the distinct advantage of being able to deliver a heavy blow all at once, and then displace and relocate before being attacked with counter-battery fire.

Interestingly, these terrible and highly effective weapons earned their own nicknames from opposing forces: the Nebelwerfer was called the "Screaming Mimi and Moaning Minnie" for the howl incoming rockets made, while the Katayusha was christened "Stalin's organ" for the sounds of its rocket motors and a configuration reminiscent of a pipe organ.

Compared with the German and Russian efforts, British and American forces developed and deployed similar weapons late in the war. The British developed the Land Mattress towed rocket launcher, while the U.S. Army built and deployed in France and Italy a small number of T34 Calliope and T40 Whizbang rocket artillery tanks.

These were converted M4 Sherman medium tanks, each holding a boxy frame containing the rockets above the still-functional tank turret. The entire rocket-launcher assembly could be jettisoned if required. **WOW**

KM Lee is a lifelong shooter and an active participant in all aspects of the shooting sports including match competition, hunting and reloading.

THE M4-SHERMAN ★

ARMOR

The Sherman weighed in at 30.3 tons and had armor thicknesses of 76 mm (3 inches). As the war progressed more powerful main guns were added to provide better punch against heavy German armor.

FIREPOWER

The Sherman employed a 75 mm main gun that carried 90 rounds. It also sported two .30 caliber machine guns. Other variants had a .50 caliber Browning machine gun mounted on top of the turret.

CREW

It served a crew of five men.

QUICK FACTS

The M4 Sherman is an iconic tank of World War II. American, British, Canadian and Soviet forces used it. Several variants were introduced on the battlefields during the course of the war. It saw service in the European and Pacific Theaters of operation.

RANGE

The Sherman had a range of 193 km (120 miles).

SPEED

The crew was carried into battle by a Continental nine-cylinder air-cooled gasoline engine that produced 400 horsepower. The maximum speed was 48 kph (30 mph) on the road.

TACTICS

The Sherman tank crews often had to work in packs to outflank superior German Panthers and Tiger variants to score hits on the thinner side and rear armor. The German Military referred to the Sherman tanks as "Tommy Cookers" due to how fast they burned when they were hit.

The Sherman was not as powerful as the German Tiger and Panther Tanks, but it made up for this in sheer numbers. The M4 could go toe to toe with Panzer III or Panzer IVs, but it wasn't a good match for a Panther or Tiger variant.

GETTY IMAGES

CAMERIQUE/GETTY IMAGES

The M4 Sherman was a medium tank that was cheaper and easier to produce. It was reliable and easily repaired, all reasons why large numbers of them were on the battlefield.

★ VS. THE TIGER

ARMOR

The armor ranged from 25 to 120 mm.

CREW

Porsche and Henschel designs developed the Tiger, and a five-man crew operated the 56.9 heavyweight.

FIREPOWER

The Tiger was equipped with an 88 mm Main Gun and sported two 7.9 mm MG 34/42 machine guns with 4,800 rounds.

QUICK FACTS

The Tiger was not mass produced like the Panzer and Panther. Its development forced the Allied Forces back to the drawing board to develop better tanks that could stand up to the sheer ferocity of the Tiger. Tigers achieved up to 19-1 kill ratios on the battlefield.

RANGE

Operating range was 110 to 195 km (68 to 121 miles). The Tiger was a gas guzzler, which proved to be a tactical weakness when fuel supplies ran scarce.

SPEED

The power plant was a Maybach gasoline engine that produced 690 hp. Top speeds reached 38 kph (24 mph).

ACES

One of the deadliest tank aces of World War II was German Tanker Michael Wittman who was credited with destroying 138 enemy tanks, 132 anti-tank guns, multiple trucks and other vehicles.

SCHROTER/PHOTOQUEST/GETTY IMAGES

The German heavy Tiger tanks were a powerful force on the battlefield, but they were sometimes immobilzed when they became clogged with ice and frozen mud.

TK

IWM/GETTY IMAGES

WAR MACHINES

A Heavy Metal Lineup of the **6 Top World War II Tanks**

By John M. McQuaid

It's freezing on this morning of Dec. 16, 1944 – the temperature is just 14 degrees Fahrenheit. You are an 18-year-old teenager, drafted into the U.S. Army, fresh out of boot camp with little or no combat experience.

Now you're in a remote, thickly forested area of the Belgian Ardennes, lightly defended by just two divisions of U.S. troops because the area wasn't considered to be vulnerable to attack.

Many of your fellow soldiers don't have the proper clothing to protect them from the harsh winter. Some of them have resorted to wrapping their feet in old newspapers and drapes they scavenged from bombed out houses. Several will subsequently freeze to death.

It's 5:30 am when you hear the creaking of tracked vehicles coming through the misty morning. You're about to find out that the Germans have just launched "Operation Mist," in what is to become known as the Battle of the Bulge.

About 250,000 crack Nazi Troops backed by approximately 600 Panzer and Tiger Tanks and other tracked vehicles moved into the Ardennes under the cover of a winter mist that concealed their movements from Allied aerial reconnaissance.

GETTY IMAGES

GETTY IMAGES

THE T-34/76

This medium battle tank was the workhorse of the Red Army during World War II. It weighed in at about 26.5 tons with a four-man crew. The T-34/76 was armed with a 76.2 mm (3 inch) main gun and two 7.62 mm machine guns. Its V12 diesel power plant produced 500 bulk hp at 220 rpm's and could reach a max speed of 53 kph (33 mph). The maximum range for the tank was about 400 km (250 miles).

The sloped armor on the T-34/76 protected it against other tank threats and was welded instead of riveted. Improvements to the armor and turret were made as the war raged on. Armor on the T-34 ranged from 16 to 60 mm. The T-34 also received a powerful 85 mm main gun. Many experts believe that the T-34 was the best tank designed during the war.

The attack catches your poorly equipped 106th Division by surprise. Two out of three regiments in this division were captured after being surrounded by the 5th Panzer and 6th SS Panzer armies.

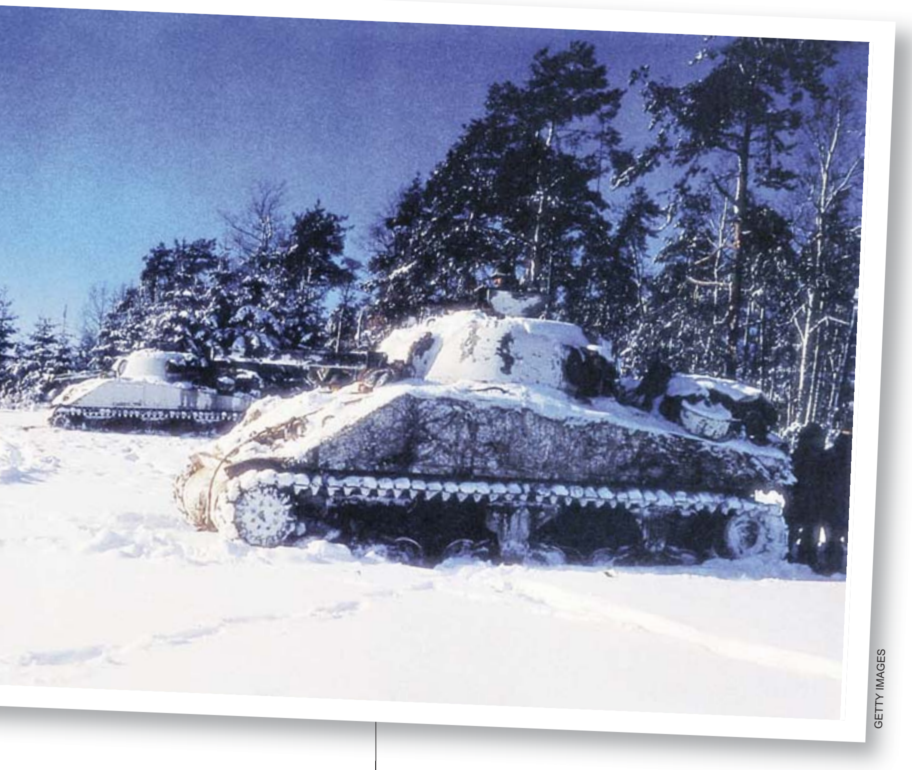
Tigers and Panzer Mark IV's open fire with their dreaded main guns. Razor sharp shrapnel flies through the air as you dive to the frozen ground. Pure chaos erupts throughout the camp as you hear officers yelling out orders only to fall on deaf ears. It's every man for himself in these first few minutes of unleashed Hell.

Your brothers who aren't killed by the barrage of high explosive tank rounds are brutally cut down by a curtain of steel rain coming from machine guns mounted on the Panzers and Tigers. You hear the screams of wounded and dying men. The smell of burnt propellant hangs heavy in the frosty morning mist.

Bazooka shells bounce off the heavily armored juggernauts or explode without doing any real damage. White ghostly images appear behind these heavy metal war machines. They are hardened Nazi Infantry well dressed for the conditions and many of them have been battle tested on the Russian front.

Tanks can be very effective when it comes to shock and awe. Thank God Allied Forces reacted quickly and stopped the onslaught before the German Panzer Armies cut their forces in half and pushed their way to Antwerp.

The battle lasted through January 25. Many of the German Tanks ran out of fuel during the Battle of the Bulge and were abandoned by their crews. The plan was to use the petrol from captured Allied forces, but that plan fell apart after the battle lines were shored up.



GETTY IMAGES

DEVELOPMENT OF THE BATTLE TANK

The main battle tanks of World War II struck terror into the hearts of civilians and soldiers alike.

The first tanks made their debut during World War I and proved their combat effectiveness in breaking entrenched German lines. Surprisingly, it was the British Navy that oversaw the production of the first tanks or "land ships."

These tanks were a game changer on the battlefield, cutting through barbed wire and protecting their crews in armored hulls against German rifle and machine gun positions.

The tanks were armed with machine guns, allowing the protected crew members to return fire with devastating effect. The shape of the hull resembled a water carrier, so the name "tank" stuck while the vehicle was developed in secret. Other nations embroiled in World War I started their own tank designs after seeing how effective they could be on the battlefield.

Technology and design improvements were significant during World War II as it became an arms race to come up with the most formidable tank that could travel the most distance before refueling.

Armor was increased in addition to the development of sloped armor. Larger, more powerful main guns were added and flamethrower variants were used in the South Pacific.

German engineering produced some of the most powerful battle tanks in the field. The Tiger, King Tiger, Panther and Panzer Mark IV are some of the more famous designs that saw action in World War II. The Russians also had formidable tanks such as the T-34/76 and the Stalin. America's Main Battle Tank was the Sherman, which was also used in variant models with British, Canadian, Polish and Russian Forces.

It is also interesting to note that the German Army took captured Sherman and T-34 tanks and marked them with the German Cross for use in the Wehrmacht. The Allied forces also made good use of captured German Panzers and re-skinned them for use on the battlefield.

Japanese main battle tanks were not as

THE PANZER MKIV

The Panzer MKIV was a medium tank weighing in at 25 tons. It was produced in great numbers throughout World War II and served as the war horse of the German Wehrmacht. It had a five-man crew with a 75-mm main gun. The Panzer was also equipped with two to three MG34 machine guns or MG42 in 7.92 mm.

The MKIV was powered by a Maybach V12 gasoline engine that produced 300 BHP at 2,500 rpms. The range on the Panzer was 200 km (120 miles). The MKIV's armor ranged from 15 to 65 mm (.59 to 2.56 inches). The Panzer MKIV supported the heavier Tiger and King Tigers that were usually the tip of the spear during German armored offensives. The MKIV also supported Infantry Units.

prevalent on the battlefields of the South Pacific due to the nature of the terrain in the areas of operation. The Chi Ha's 57 mm main gun did not match up well against the Sherman M3 and M2A4 tanks of the American 192nd Tank Battalion. This was the first time American tanks met Japanese tanks in battle. The two forces engaged in tank-to-tank battle near Damortis at Luzon in the Philippines.

OPERATION CITADEL

The largest tank battle of World War II took place in July 1943 between German and Russian Armies at the Battle of Kursk. Kursk was highly coveted by both sides due to its strategic oil reserves. Winning this battle was highly important to Nazi Command as they wanted desperately to show that they were still a force to be reckoned with after the stinging defeat they suffered at Stalingrad.

The German Army sent 900,000 soldiers to the region including

"...THE SHEER NUMBERS OF SHERMAN AND T-34 TANKS CONTRIBUTED GREATLY TO THE DEFEAT OF THE WEHRMACHT."

U.S. tanks in Belgium in January 1945 struggle to contend with the winter during the Battle of the Bulge.

GETTY IMAGES

THE TIGER

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THE M4-SHERMAN

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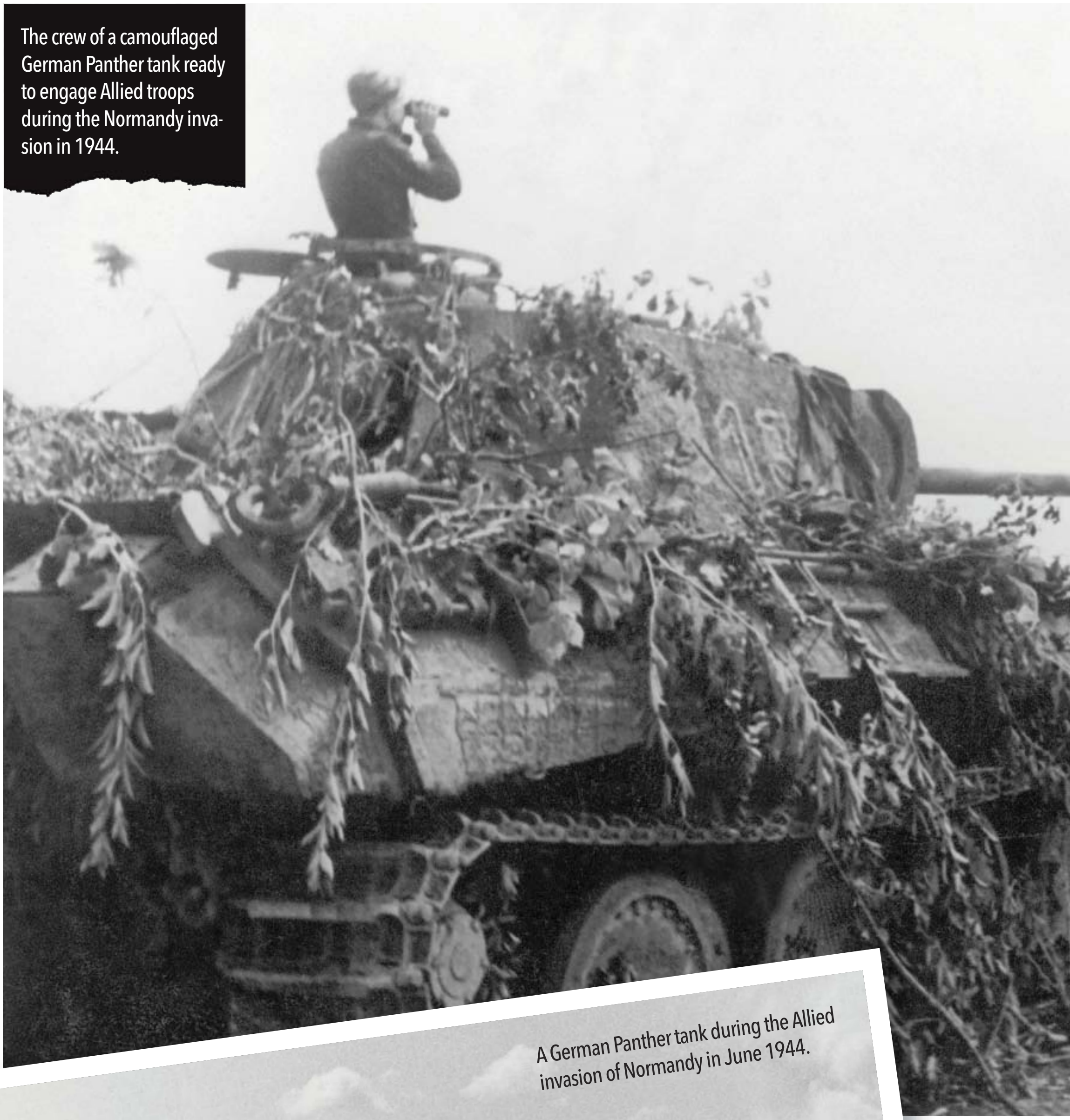
The Sherman employed a 75 mm main gun that carried 90 rounds. It also sported two .30 caliber machine guns. Other variants had a .50 caliber Browning machine gun mounted on top of the turret.

THE IOSIF STALIN 2 OR IS-2

The IS-2 main battle tank was developed in 1943 at the Chelyabinsk Factory. Its frontal sloped armor was impervious to the fearsome German 88 mm tank gun. It had a four-man crew and weighed in at 46 tons. A V12 diesel power plant propelled the IS-2, which produced 600 bulk horsepower with a max speed of 37 kph (23 mph). The IS-2 had a range of 240 km (150 miles) due to the added weight.

The main gun was a powerful 120 mm, which was more than capable of destroying a heavily armored Tiger tank. The Stalin also had three 7.62 mm machine guns in addition to a 12.7 mm heavy machine gun. Armor on the IS-2 ranged from 30 to 120 mm. German Tigers had to develop a wolf pack style attack method to defeat an IS-2. The side and rear armor was more vulnerable to the 88 mm main gun of the Tiger.



The crew of a camouflaged German Panther tank ready to engage Allied troops during the Normandy invasion in 1944.

A German Panther tank during the Allied invasion of Normandy in June 1944.

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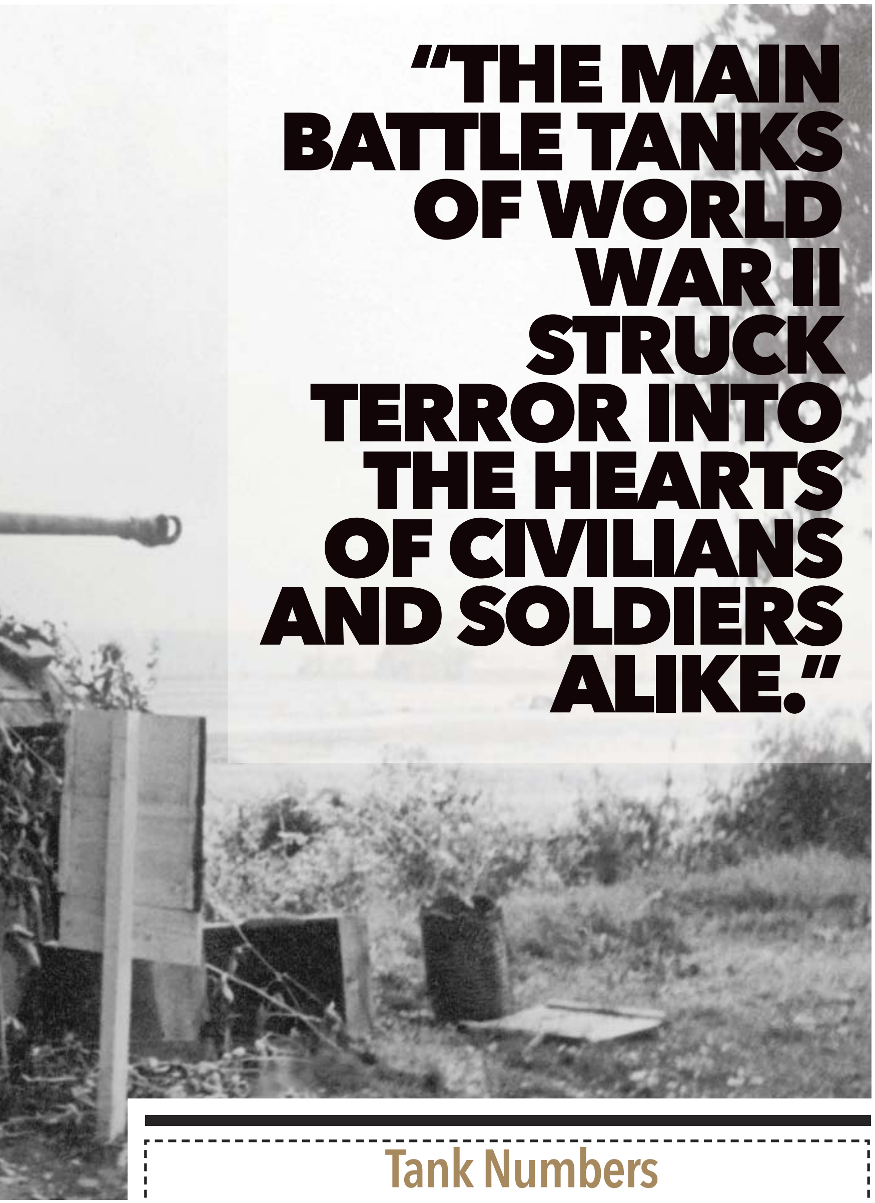


"THE MAIN BATTLE TANKS OF WORLD WAR II STRUCK TERROR INTO THE HEARTS OF CIVILIANS AND SOLDIERS ALIKE."

10,000 artillery pieces, 2,000 aircraft, and 2,700 tanks as part of "Operation Citadel." This battle was a must-win for the Germans who went all in.

The Russian Army consisted of 1.3 million soldiers, 20,000 artillery pieces, 3,600 tanks and 2,400 planes. The Russians dug in deep and set tank traps as well as anti-tank gun emplacements. They also deployed 400,000 anti-tank and anti-personal mines on the battlefield.

Two super heavyweights engaged in a bloody knock down drag out brawl with no rules.

At the end of the violent tank battle, the Germans were beaten back by advancing Soviet tanks, air force and ground troops. The Russians formed wolf packs of T-34s and would move against one Tiger or Panther sacrificing two to three tanks so that one could get off an armor piercing round into the softer skinned area of a German tank. Germany lost the Battle of Kursk despite the estimate that the Soviets suffered many more tanks.

History has proven that sheer numbers of medium tanks can defeat smaller numbers of superior larger tanks. Germany had excellent heavy tanks in the Tiger and Panther variants.

The smaller Sherman M4 and Russian T-34 proved to be more agile and, when hunting the larger Tiger and King Tiger, proved more lethal. The old saying "Speed Kills" well suits this David and Goliath struggle that was repeated time and time again during World War II.

GAME CHANGERS OF THE BATTLEFIELD

World War II proved that necessity is the mother of invention. The Germans came out with improved tank designs to counter the Soviet-built T-34. The USA and Great Britain followed suit in providing better main guns and frontal armor to the Sherman M4 to meet the challenges that the Tiger and Panther posed.

The Russians then produced more powerful tanks to counter the Tiger and Panther. It can be concluded that the sheer numbers of Sherman and T-34 tanks that rolled off the production lines contributed greatly to the defeat of the Wehrmacht.

Lack of adequate fuel supplies also hampered the German tankers. They may have had the best main battle tanks, but they lacked the logistical support needed to keep them running. Replacement Tigers and Panthers didn't come as easily to the front lines either. Wars are usually fought and won by attrition. The same can be said about the tank battles of World War II. Tank warfare forever changed the dynamic of the modern battlefield. **WOW**

John M. McQuaid is a police officer and a firearms instructor in upstate New York.

Tank Numbers

30.3

In tons, the weight of the Sherman

121

In miles, the range of the Tiger

5,100

The number of rounds for the secondary armaments on the Panzer

30 TO 120

In millimeters, the armor on the IS2

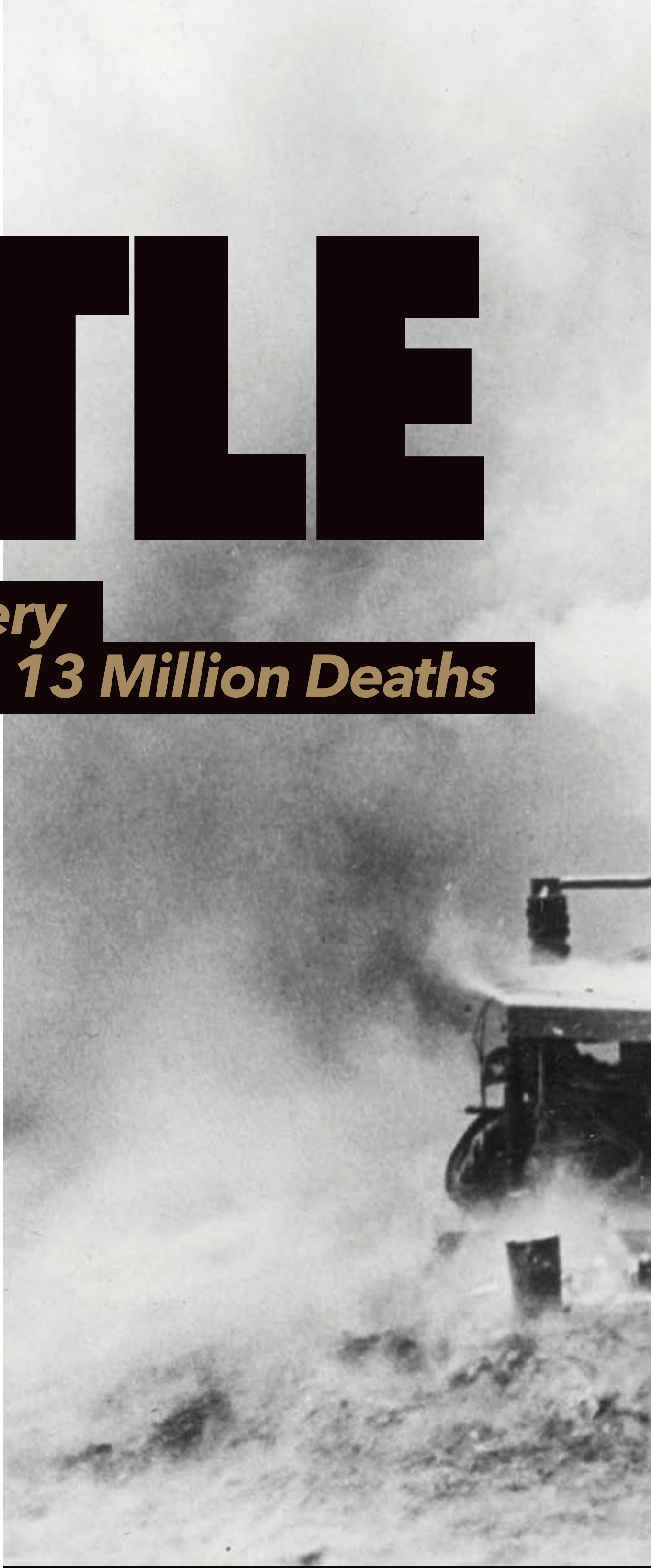
33

In miles per hour, the speed of the T-34/76

KING OF BATTLE

*In World War II, **Field Artillery Accounted For More Than 13 Million Deaths***

By Stratten Waldt



The history of the cannon as a weapon of war is nearly a millennium old, and it began with the gunpowder artillery of China's Song Dynasty.

In the West, cannons got their first real use during the Hundred Years War, though they were largely immobile. In the 15th century, there were advances in mobilization technologies, and the idea of field artillery became viable. By the 17th century, it was common practice to outfit ships with cannons. Thereafter, artillery pieces were used in nearly every major Western conflict.

By the 20th century, advances in artillery technology and accuracy had pushed the big guns away from the front line. However, this made them no less effective, and they were responsible for nearly 75 percent of the casualties in World War I, up to that point one of the deadliest conflicts in human history. It maintained this distinction during World War II, and produced more damage than any other weapon system on the battlefield.

World War II led to the creation of some of the most amazing and destructive artillery pieces the world had ever seen. The trend of creating cannons with ever-increasing calibers was reaching its peak, and some of the guns produced are better known for being unusable marvels of engineering than they are for actually producing casualties (a trend which has since reversed itself, and we will likely never again see guns of such massive scale).

The Gustav

By the Numbers

1,350

In pounds, the gun's weight

U.S. ARMY CENTER OF MILITARY HISTORY

30
In miles, the distance the shells traveled

80
In centimeters, the caliber of the shells

11,000
In pounds, the weight of the shells

100
In feet, the amount of rock forces used to protect their ammunition from the Gustav

New Technology

In World War II, there was a host of new technologies with applications for artillery, including:

1 Radar
This allowed for drastically improved ranging of targets.

2 Radio
This allowed for coordinated fires, and this was highly advantageous to the U.S., which had the capacity to distribute massive numbers of radios to artillery units.

3 Observation Vehicles
Specialized artillery observation vehicles which enabled greater accuracy and control over large numbers of pieces

4 Self-propelled Weapons
Though SPs were in development during World War I, they did not make any significant contributions until the second World War, when they were prized for their mobility.

TECHNOLOGY ADVANCES

World War II led to some of the more significant advances in artillery technology (see sidebar "New Technology"), and there were also improvements in the artillery pieces of the major powers, with the exception of Japan, which used a negligible amount of artillery during the war.

For divisional use, the Germans opted for the 105 mm howitzer as the main close support weapon and a 150 mm howitzer for medium range. German tanks were repeatedly upgraded with better main guns. The Panzer III, for example, was originally designed with a 37 mm gun, but entered mass production with a 50 mm cannon to better counter the threat represented by the Russian T-34s. Germany also invented the 8.8 cm KwK 43, a notoriously powerful piece of artillery adapted to be the main gun for the Panzer IV and Panther tanks. It was also effective as an anti-tank gun and fired highly damaging armor-piercing shells. It was capable of destroying Allied tanks at great ranges.

On the British side, the Ordinance QF 25-pounder (or the 25-pdr) was the main British field gun and howitzer of the war. It was meant to replace the 18-pounder, which had been in service since 1904. It is considered one of the most effective artillery pieces of World War II.

When greater mobility was a consideration, the British developed the Ordinance Quick-Firing 17-pounder (also known as the 17-pdr), which was originally conceived as an anti-tank gun, though it was also equipped as the main gun on a number of British tanks. It was a massive improvement over the 2-pounder and 6-pounder guns the British had been using prior to 1939, which had been largely ineffective against German tanks. The 17-pdr was too large to be mounted on many British tanks; therefore, the British devised a conversion for the U.S.-supplied M4 Sherman tanks. Named the Sherman Firefly, it was rushed into service in time for D-Day.

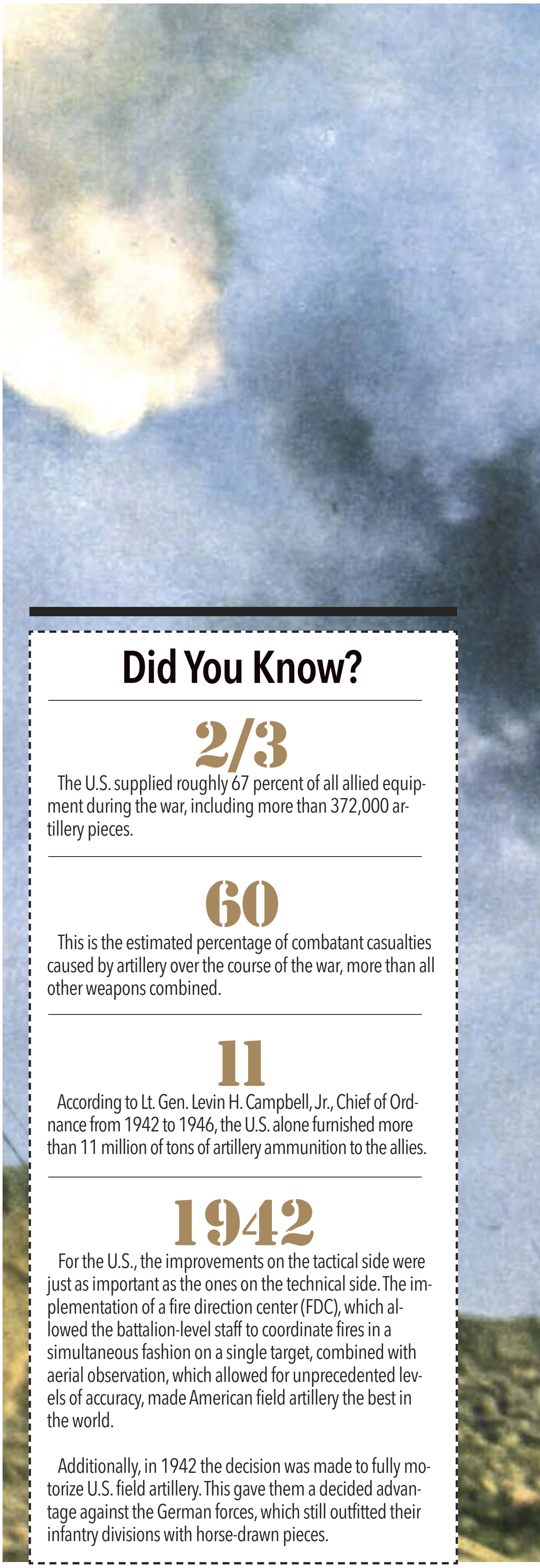
Like the Germans, U.S. forces used 105 mm and 150 mm howitzers as their weapon of choice for short- and medium-range fire. By the end of the war, virtually all of the American weapon systems had been upgraded from the French-made weapon systems used during World War I.

INDIVIDUAL POWERS

Let's now look at the specific countries.

The Soviets

For the Soviets, cannons were of monumental importance, as their doctrine of deep battle



Did You Know?

2/3

The U.S. supplied roughly 67 percent of all allied equipment during the war, including more than 372,000 artillery pieces.

60

This is the estimated percentage of combatant casualties caused by artillery over the course of the war, more than all other weapons combined.

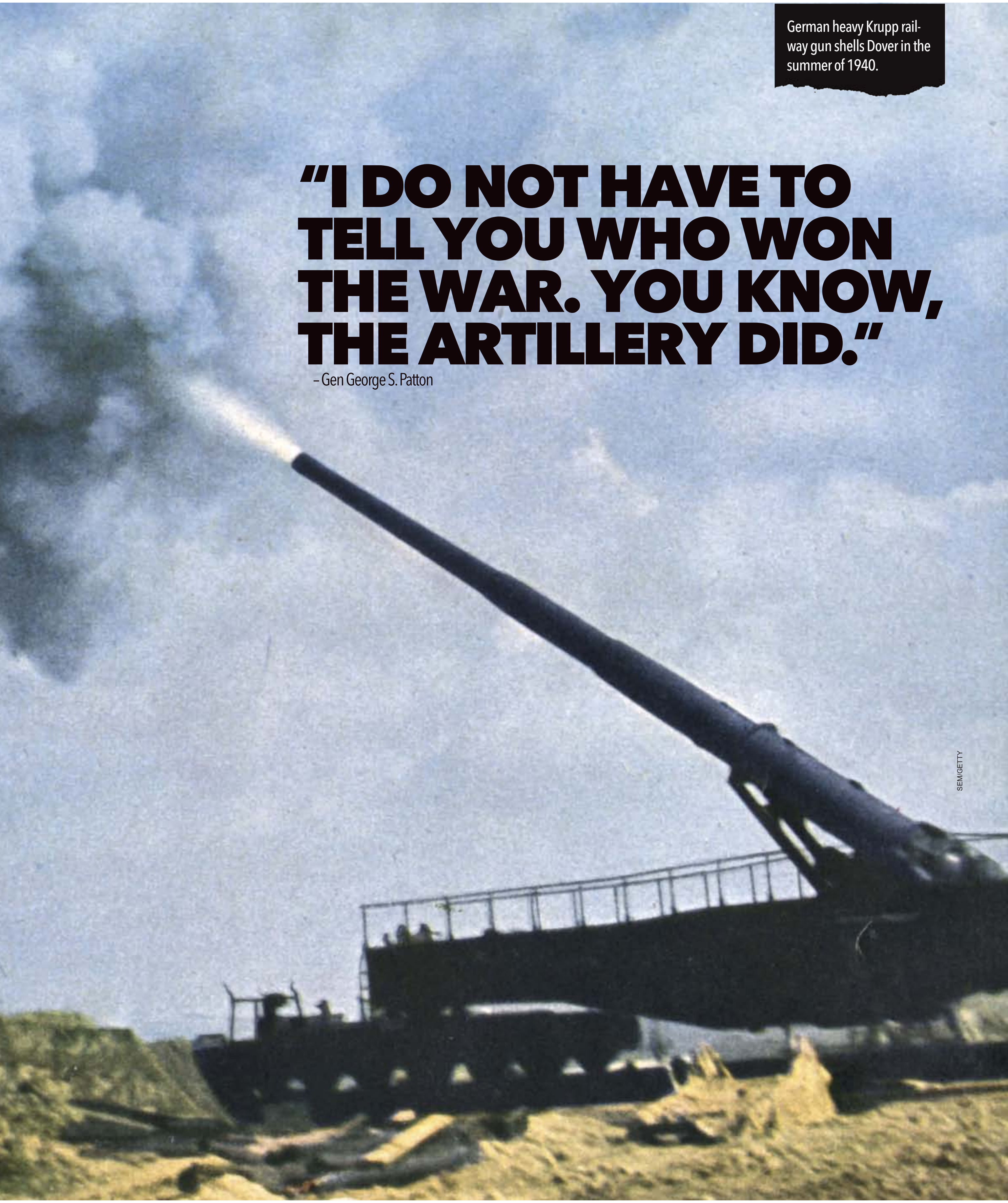
11

According to Lt. Gen. Levin H. Campbell, Jr., Chief of Ordnance from 1942 to 1946, the U.S. alone furnished more than 11 million of tons of artillery ammunition to the allies.

1942

For the U.S., the improvements on the tactical side were just as important as the ones on the technical side. The implementation of a fire direction center (FDC), which allowed the battalion-level staff to coordinate fires in a simultaneous fashion on a single target, combined with aerial observation, which allowed for unprecedented levels of accuracy, made American field artillery the best in the world.

Additionally, in 1942 the decision was made to fully motorize U.S. field artillery. This gave them a decided advantage against the German forces, which still outfitted their infantry divisions with horse-drawn pieces.



German heavy Krupp railway gun shells Dover in the summer of 1940.

"I DO NOT HAVE TO TELL YOU WHO WON THE WAR. YOU KNOW, THE ARTILLERY DID."

– Gen George S. Patton

SEM/GETTY

Advancements In Technology

The war led to some of the more significant advances in artillery technology since its inception more than eight centuries earlier, including:

Sabot Rounds

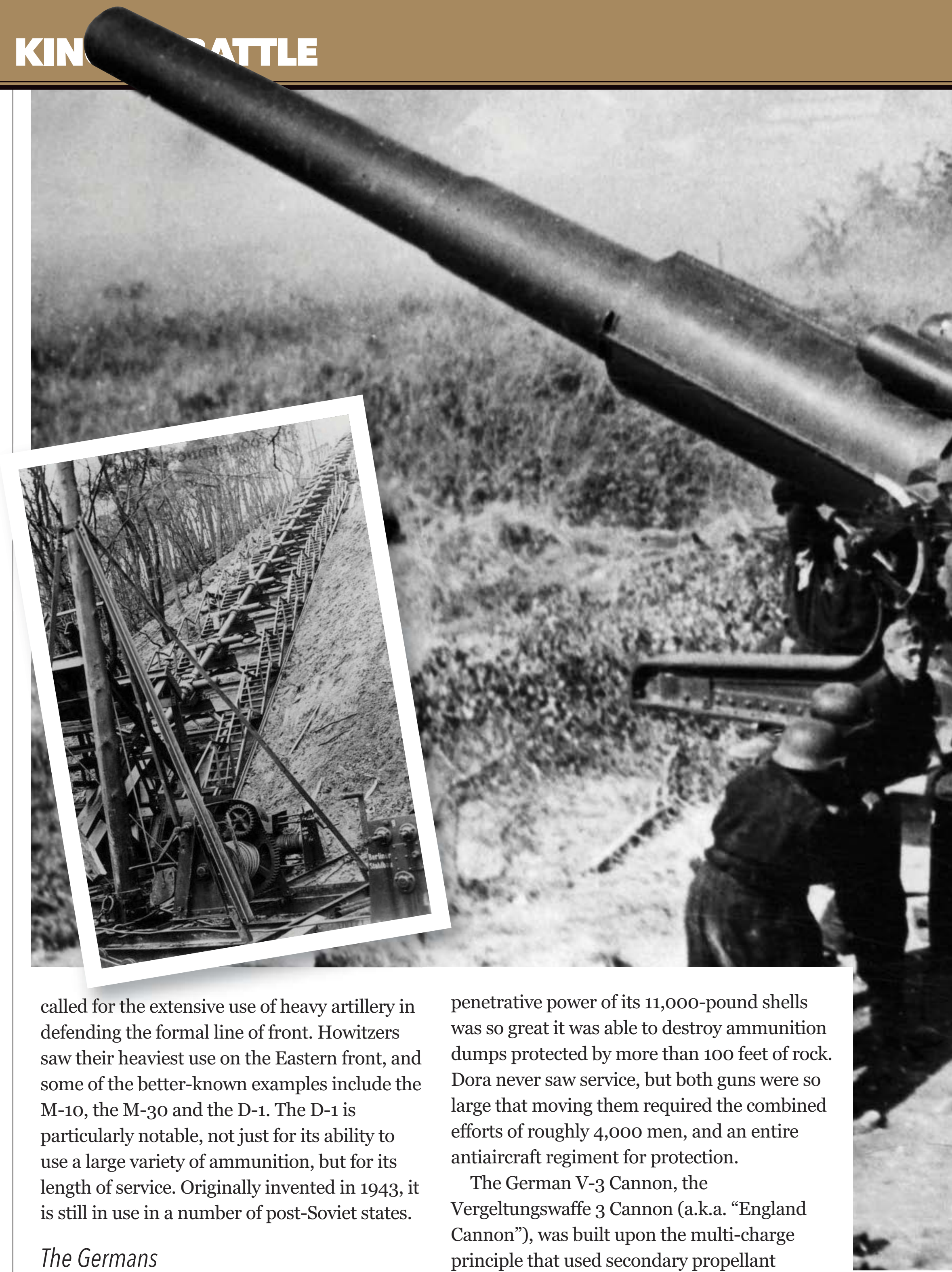
These were projectiles that required a device to hold them in place, as they were of a smaller-bore diameter than the barrel they were being fired from. This vastly improved the muzzle velocity of the projectile.

Hollow-Charge Projectiles

All of the major powers of World War II, including Germany, Britain, the Soviet Union and the U.S., developed shaped-charge munitions, which revolutionized anti-tank warfare.

Proximity Fuses

These were used to detonate an explosive device when distance to desired target was less than a specified value. They were highly effective against air targets in ground troops. They were a closely guarded secret of the Allied Forces, protected to a similar level as the D-Day invasion and the atom bomb project, and were used to counter both V-1 flying bombs and kamikaze attacks.



ABOVE RIGHT: A prototype of the German V-3 cannon that used multiple timed propellant charges along the barrel to boost velocity of the projectile.

called for the extensive use of heavy artillery in defending the formal line of front. Howitzers saw their heaviest use on the Eastern front, and some of the better-known examples include the M-10, the M-30 and the D-1. The D-1 is particularly notable, not just for its ability to use a large variety of ammunition, but for its length of service. Originally invented in 1943, it is still in use in a number of post-Soviet states.

The Germans

The Germans created some of the war's most impressive but impractical pieces of weaponry. This included the Schwerer Gustav and Dora, German railway guns intended to destroy the forts along France's Maginot Line in the early offensives of the war. However, the blitzkrieg tactics of the German forces proved to be so effective that the Gustav did not see use until the siege of Sevastopol during Operation Barbarossa. The fully assembled gun weighed nearly 1,350 times, could fire shells nearly 30 miles and had a caliber of 80 cm. The penetrative power of its 11,000-pound shells was so great it was able to destroy ammunition dumps protected by more than 100 feet of rock. Dora never saw service, but both guns were so large that moving them required the combined efforts of roughly 4,000 men, and an entire antiaircraft regiment for protection.

The German V-3 Cannon, the Vergeltungswaffe 3 Cannon (a.k.a. "England Cannon"), was built upon the multi-charge principle that used secondary propellant charges along the barrel to drastically increase the speed of the projectile. While it was originally designed to fire across the English Channel, and was eventually able to attain a maximum range of 93 km, it was never used for its intended purpose. It was used in combat for only 11 days in 1945, as it was used to shell the recently liberated city of Luxembourg.

The Americans also considered the possible use of a "supergun." It was known as "Little David," a mortar originally used as a launch mechanism to test aerial bombs at Aberdeen

German artillery unit shells French positions during the Nazi invasion in 1940.

ULLSTEIN BILD / GETTY

Proving Ground. It possessed a caliber of 91 cm, the largest ever, and though it was not originally intended for combat, before the war ended preparations were being made for its use in the expected invasion of Japan. It was probably for the best that these plans were scrapped, as there were questions about its range and mobility, which would have rendered its use impractical.

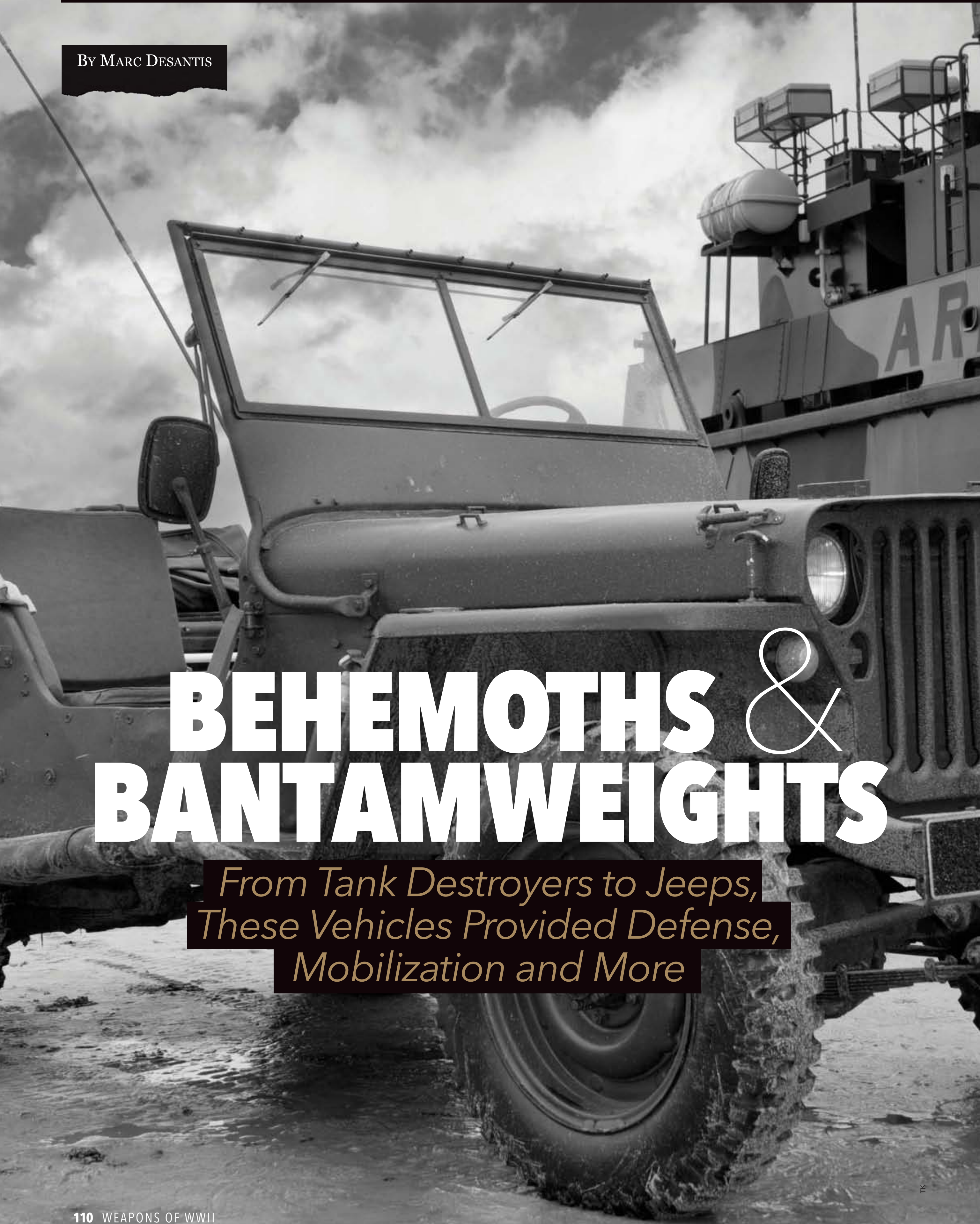
DESTRUCTION

When all is said and done, World War II may represent the last time two opposing forces were able to operate artillery on such a massive scale. No conflict before or since had seen such destructive force in the form of field artillery.

Tens of millions of tons of heavy ammunition were fired by the combined efforts of both sides, with more than 13 million deaths attributable to cannon fire. Since the start of the 20th Century, field artillery has been called the "King of Battle" for a reason. **WOW**

Stratten Waldt is a freelance writer and army officer from Durham, North Carolina. He joined the Corps of Engineers after completing ROTC in 2013.

By Marc DeSantis



BEHEMOTHS & BANTAMWEIGHTS

From Tank Destroyers to Jeeps, These Vehicles Provided Defense, Mobilization and More

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In many ways, World War II was a proving ground for innovative military vehicles that were rushed to the battle front to fill tactical needs. Many were adapted to different roles as their strengths and weaknesses became apparent. Here are a few examples:

JAGDTIGER

German Tank Hunting Juggernaut

The Gargantuan Tank Destroyer was Deadly but Rare

The Germans saw the tank destroyer, which lacked an expensive and complicated turret, as a cheaper alternative to a tank. They produced many tank destroyers instead of tanks in an effort to get more armored fighting vehicles out of the factory and to the front.

The fixed main gun of the tank destroyer was usually bigger than the one found on the tank upon which the tank destroyer was based, but its traverse was much more limited, and the vehicle was less flexible in combat. The tank destroyer excelled in defensive fighting, where this would be less of a drawback. Lying in ambush, it would use its cannon to knock out enemy tanks from long range.

The most lethal tank destroyer of the war was Germany's 79 ton Jagdtiger "Hunting Tiger" built upon the same chassis as found on the King Tiger heavy tank. The armor on the Jagdtiger was extremely thick. The front hull was protected by 150mm of steel, while the front of the superstructure, just behind the main gun, carried a whopping 250mm of armor.

The Jagdtiger, the heaviest armored fighting vehicle of the war, was nearly invulnerable to most other tank weapons that it would encounter on the battlefield, but this protection came at a steep price. It was very heavy, and thus slow, able to reach a top speed of just 24 mph and its engine chugged fuel with abandon. This severely restricted its range and for the most part the Jagdtiger was employed in static positions.

Allied bombing of German factories hampered the production of these giants so much that only 77 machines were completed by war's end. The 128mm guns were also scarce and so the final 26 Jagdtigers assembled had to be fitted with the less-powerful (but still extremely potent) 88mm KwK 43/3 L/71 gun found on the King Tiger tank.

The enormous 128mm PaK 44 L/44 main gun was an outstanding tank killer. Its rounds were so weighty that they had to be split into two parts for loading. This also reduced the number of rounds that could stowed, a mere 38, and this, when coupled with the gas-guzzling vehicle's poor range, decreased its overall effectiveness.

LVT AMTRAC

Amphibious Tractor

American Alligator in the Pacific

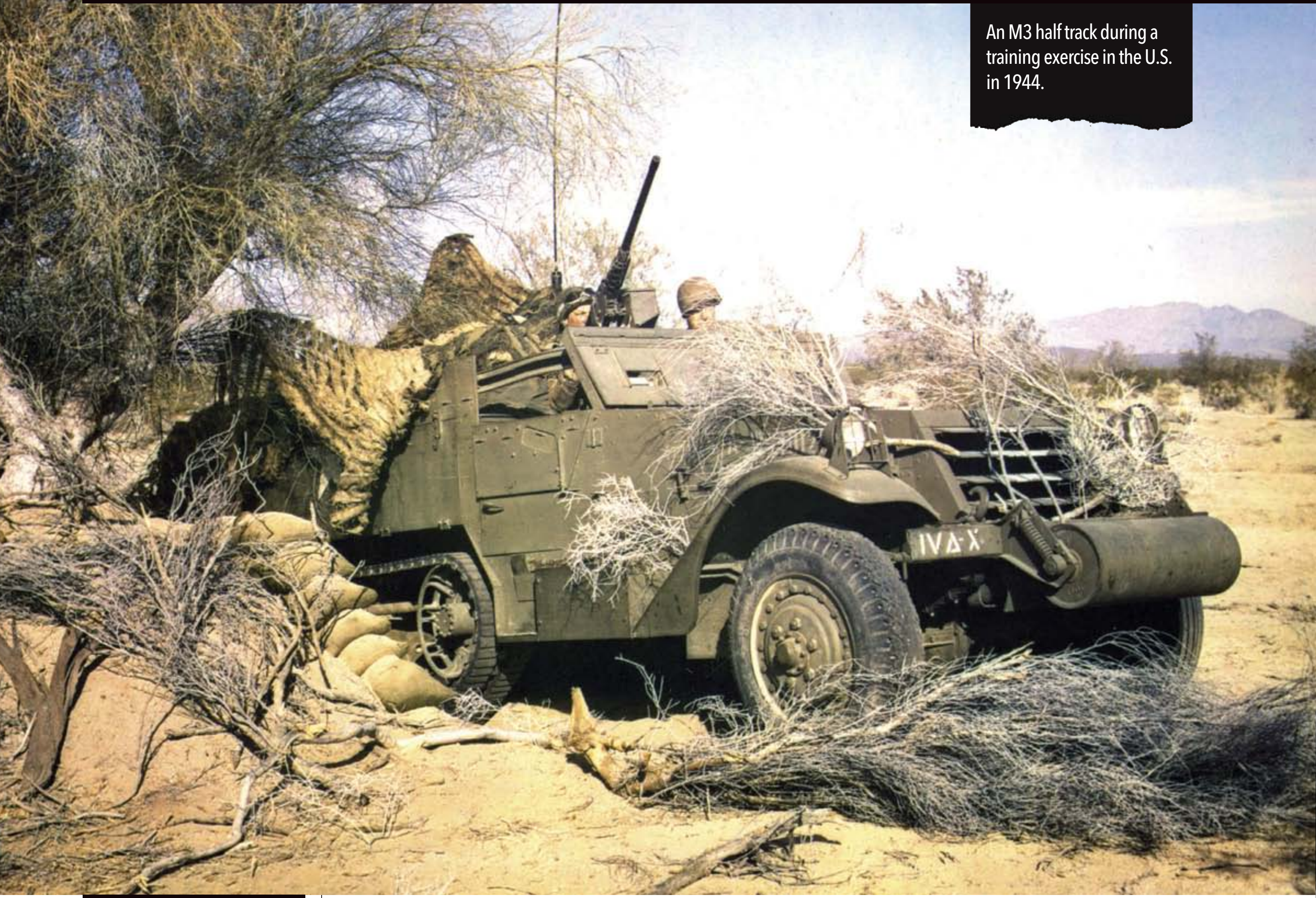
The prototype of the Amtrac was a civilian machine designed to rescue stranded hurricane survivors in inundated sections of Florida. Nicknamed "Alligator," the light amphibious tractor, or "amtrac," could cross water and then immediately operate on land.

British soldiers in a Bren Gun Carrier advance during the liberation of France in 1944.

This made it suitable for amphibious, ship-to-shore operations and the U.S. Navy contracted for 200 vehicles in early 1940. The first to enter military service were steel-hulled LVT(1) Amtracs made by the Food Machinery Corporation in Florida.

Mechanically, the 16.5 ton LVT (Landing Vehicle Tracked) was mostly conventional, using proven components that the military already used for other vehicles in its inventory.

Its transmission and air-cooled, gasoline-fueled seven-cylinder Continental W670-9A radial engine, for example, were the same as those found in the M3 Stuart light tank. Propulsion was achieved by driving tank-like



An M3 half track during a training exercise in the U.S. in 1944.

GETTY IMAGES

STRENGTHS AND WEAKNESSES

M3 Half-Track

Strengths
They could go where trucks could not, infantry could enter combat unencumbered by heavy packs

Weaknesses
Light armor

tracks fitted with long, angled cleats, which allowed for movement on both and land and water.

The first major combat use of the LVT was during the invasion of the Pacific island of Tarawa in November 1943. Though not meant to be an assault vehicle, Browning .30-cal. and .50-cal. machine guns were mounted for defense.

Subsequent versions of the Amtrac added improvements such as thicker armor. The LVT(4) moved the engine to the front so that a ramp could be installed in the rear. The enlarged, 541 cubic-foot cargo hold of the LVT(4) was spacious enough to transport jeeps and heavy artillery directly to the beach.

The incomparable usefulness of the 15 mph Amtrac did not end when it finished ferrying men and supplies to the front lines, but continued when it quickly evacuated wounded straight to hospital ships lying offshore. With an Amtrac, there was no need to spend precious time putting casualties onto boats for transport—it could do the job all by itself.

M3 HALF-TRACK

Multipurpose Infantry Mover

A Personnel Carrier That Could Keep Up With Tanks

The U.S. Army needed a vehicle that could carry infantry at the same speed as the tanks that were coming to dominate warfare. Its solution was the half-track. With its lower ground pressure, the half-track could go where trucks could not and stay with the tanks.

Infantry gained by stowing their gear inside the half-track, allowing them to enter combat unencumbered by heavy packs. The tanks they accompanied benefited from the protection that infantrymen provided against unseen enemies.

The tracks differed from those found on tanks. Called endless rubber band tracks, they were made by vulcanizing rubber directly over steel cabling with metal track guides in the center, resulting in a durable and low-maintenance means of locomotion.

The M3's 142.5 horsepower White engine provided it with respectable power and the half-track could reach speeds of up to 45 mph on roads and 20 mph during cross-country movement.

The M3 did have drawbacks, one of which was very light armor. The thin sides could be penetrated by rifle bullets and this did not endear it to the soldiers riding inside. But the M3 also proved very adaptable and heavy weapons could be placed on it so that it could fulfill roles besides moving infantry.

The M3 75mm GMC, with a crew of five, carried the M1897A4 75mm gun for antitank work. Other half-tracks mounted rocket launchers, howitzers, and .50-cal. machines guns for antiaircraft defense.

BREN GUN CARRIER

Cross-Country British Transport

Small, Fast, Jack of All Trades

Developed in the 1930s, the Universal Carrier, known better as the "Bren Gun Carrier," came about in response to a British Army requirement for a tracked vehicle that could fulfill a wide range of battlefield roles.

In service, the carrier did exactly what its name suggests—it carried things. Many models did indeed carry the distinctive .30-cal. Bren machine gun with its distinctive top-mounted magazine. In particular, the Universal Carrier, with a top speed of 30 mph, was meant to transport troops across open ground and attack with the Bren machine gun.

Other weapons were emplaced too, including 2- and 3-inch mortars, smoke generators and heavy .55-cal. caliber antitank rifles. The carriers were also used to tow light artillery, such as the 6-pdr antitank gun, and as ambulances.

British airborne divisions landed their Carriers behind enemy lines in Hamilcar gliders. With some extra plates attached and the application of sealant compound, they could be made reasonably watertight, and several took part in the amphibious landings on D-Day.

The Universal Carrier was used in almost every theater of the war by numerous Allied

STRENGTHS AND WEAKNESSES

The Jagdtiger

Strengths
Lethal tank destroyers

Weaknesses
It held a limited number of rounds and had limited range

A U.S. convoy navigates a flooded road in 1944.

QUICK FACTS:

JEEP

Country of Origin
United States

Weight
2,450 pounds

Engine
Willys Model 442 "Go-Devil," 55-hp, 134 cubic inch, 4-cylinder

Capacity
4 (including driver)

Speed
60 mph (maximum)

Range
218 miles

Number Constructed
647,343

BREN GUN CARRIER

Country of Origin
Britain

Weight
4.5 tons

Engine
ord V-8 (65-95 hp depending on model)
Armor: 4 to 10mm

Crew
4

Speed
30 mph

Range
140 mph

Weapons
.303.cal. Bren machine gun; mortar, antitank rifle

Number Constructed
113,000 (all types)

M3 Half-Track

Country of Origin
United States

Weight
10 tons

Engine
White 160AX 142.5-hp 386-cubic-inch in-line six-cylinder (gasoline)
Armor: ¼ inch to 5/8 inch

Capacity
13

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> **"LYING IN AMBUSH, IT [JAGDTIGER] WOULD USE ITS CANNON TO KNOCK OUT ENEMY TANKS FROM LONG RANGE."**

armies, especially those of the British Commonwealth, but it was by no means perfect. With an open top, the crew of the diminutive 4.5 ton vehicle was very vulnerable to enemy fire.

JEEP: American Original

Go Anywhere, Do Anything

In 1941, even before American entry into World War II, the U.S. Army solicited bids for a ¼-ton, 4x4 truck design. The Army wanted a small, all-terrain motor vehicle that could perform myriad roles. Most important, the vehicle would help motorize the entire Army, giving it unprecedented mobility.

The Army's Quartermaster Corps picked the Willys design, with Ford Motor Company also taking part in producing the vehicle that would be immortalized as the "jeep."

The jeep was found in all theaters of the war, and was used in myriad roles both on and off the battlefield. Each U.S. armored division would be equipped with 449 jeeps, while an infantry division would have 612 vehicles. Reconnaissance was one of the jeeps roles, and to defend itself many were mounted with a Browning .30-cal. machine gun, while others would carry the heavier Browning .50-cal. heavy machine gun. Some jeeps were armed with rockets and bazookas.

The rugged little jeep was also used to tow artillery, as an ambulance to evacuate wounded, as a utility vehicle on airfields, as a staff car, and to carry ammunition and other supplies.

With its muscular 55-horsepower Go-Devil engine, the jeep could plow through snow, sand, and deep mud. Whether it was the frozen roads of northern Europe, the bone-dry deserts of North Africa, or the rain-drenched jungle trackways of the Pacific, the jeep could handle any terrain with aplomb.

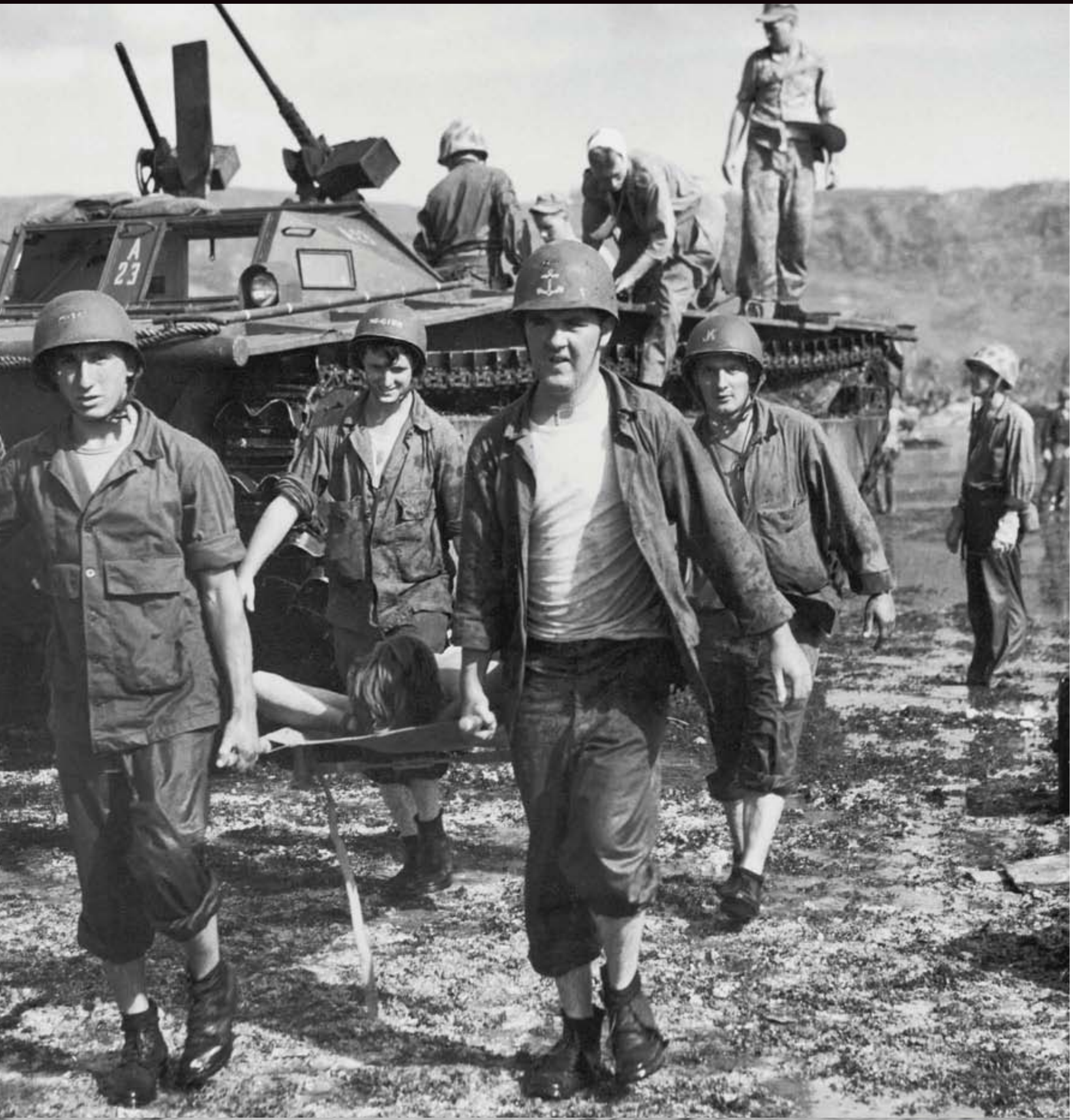
The jeep would also be used extensively by other Allied armies, with 30 percent of all jeeps delivered via Lend-Lease Act. The success of the jeep is best seen in the numbers that rolled out of American factories—almost 650,000. The basic design was so sound that jeeps served in the U.S. Army and Marines Corps well into the 1980s. **WOW**

Marc DeSantis is an historian and attorney who has written extensively on military historical subjects.

U.S. soldiers carry a wounded comrade. A tracked landing vehicle is shown in the background.

Australian soldiers motor across the Egyptian desert in a Bren Gun Carrier in 1943.

GETTY IMAGES



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Speed
45 mph (road)
20 mph (cross-country)

Range
200 miles

Number Constructed
53,813 (all variants)

LVT Amtrac

Country of origin
United States

Weight
16.5 tons

Engine
Continental W670-9A 250 hp 668 cubic inch nine-cylinder radial

Armor
¼ inch steel plate

Capacity
16 to 30

Speed
15 mph (land)
7 mph (water)

Range
150 miles (land)/100 miles (water)

Number Constructed
18,620 (all variants)

Jagdtiger

Country of Origin
Germany

Weight
79 tons

Engine
700bhp Maybach HL 230 P30 V12-cylinder (gasoline)

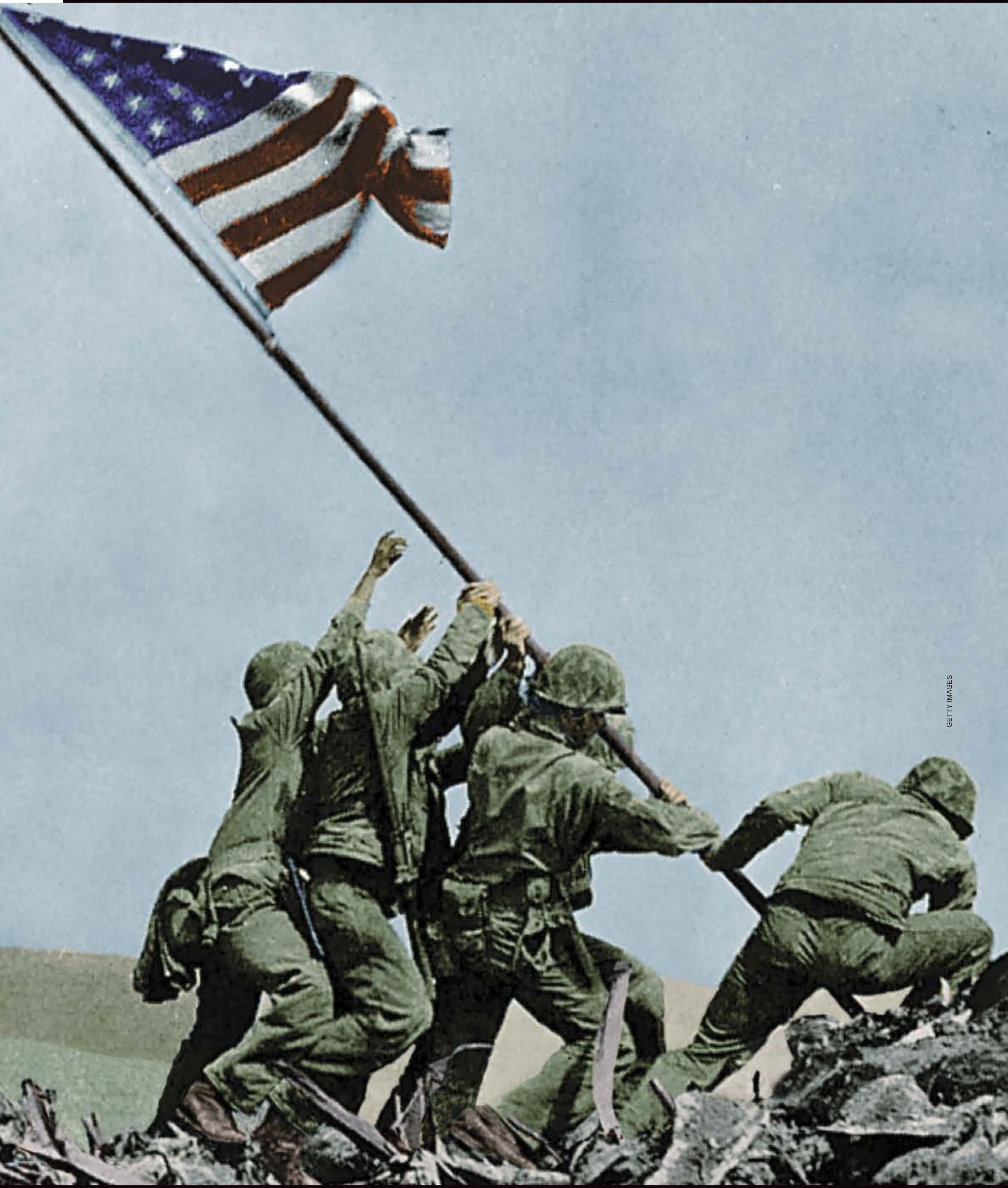
Armor
150 mm hull front; 80 mm hull sides; 80 mm hull rear; 250 mm superstructure front

Crew
Six

Speed
24 mph (maximum)

Weapons
128 mm PaK 44 L/44 main gun; 7.92 mm MG 34 machine gun in hull front

Range
106 miles (road); 75 miles (cross-country)
Number Constructed: 77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U.S. Marines raise the flag on Mount Suribachi on the island of Iwo Jima on Feb. 23, 1945.